Defossilising the chemicals industry– Institution of Chemical Engineers (IChemE)

1. Executive Summary

- The UK faces a crucial decision about the future of its chemicals industry. How much production capacity should the country have in the future, and what kind of chemicals should it be producing? The answers to these questions have fundamental implications for the defossilisation of the chemicals industry.
- A clear, consistent and long-term policy framework and incentives are crucial for supporting the defossilisation of the chemicals industry, and allowing businesses to make the long-term investments needed to deliver change.
- Government should use the opportunity presented by the forthcoming industrial strategy to promote a unified policy and strategic direction on chemicals and defossilisation.
- Economic incentives play a crucial role in encouraging defossilisation, and Government has a central role to play in setting these up.
- Delivering defossilisation requires an appropriately large and skilled workforce. Without more chemical engineers, the UK risks not being able to make this transition effectively.
- The Government should prioritise chemical and process engineering education and training at all levels – supporting significant expansions in technical and apprenticeship, undergraduate and postgraduate, and post-doctoral routes.

2. Introduction and background

Industry makes extensive use of fossil resources as both fuel and feedstock. However, this poses a serious challenge for our environmental aspirations - particularly given that alternative pathways for many essential chemicals remain unavailable or underdeveloped. While there is growing interest in bio-based and renewable feedstocks, many chemical production processes remain entrenched in fossil fuel dependency due to historical efficiency, cost-effectiveness, and established infrastructure. In February 2025, IChemE convened an expert roundtable to explore the prospects for defossilisation of the UK chemicals industry, and how it might best be approached and supported. This write-up presents an anonymised summary of key themes from the conversation.

3. Emerging themes

3.1 Policy environment

A recurring theme was the necessity for a clear, consistent and long-term policy framework to support the transition of the chemicals industry. It was noted that government plays a key role in shaping the expectations and plans of companies and investors. For businesses and investors to commit resources to the new technologies and projects that will deliver defossilisation, they need to be confident of the context in which they are making those investments, and the policy environment is a key part of that.

Participants noted that responsibility for policy relevant to the chemicals industry is split among a number of government departments (in particular, the Department for Energy Security and Net Zero, Department for Business and Trade, Department for Environment, Food & Rural Affairs), making it more challenging to achieve a consistent policy direction across Government.

3.2 Paths forwards for the UK chemicals sector

A wide spectrum of different possible futures confront the UK chemicals sector, ranging from the UK establishing itself as a leader in sustainable chemical production, through to the chemical industry being offshored due to cost pressures and competition from abroad. Participants noted that offshoring did not by itself solve the critical problem of defossilisation of the industry, and could simply lead to the problem being shifted overseas.

The UK faces a set of crucial decisions about the future of its chemicals industry, including the extent to which the UK should aim to be a significant producer of chemicals in the future. Government, consumers and industry all have important roles to play in the UK's ultimate answer to this question, and by setting out how it plans to shape the UK economy in the long term, the Government can provide a crucial signal for the wider economy. The forthcoming industrial strategy was seen as presenting a key opportunity to do this.

3.3 Economic and market incentives

Participants agreed that commercial realities present a significant barrier to companies looking to transition away from fossil fuels. There are significant upfront costs of transitioning due to the need to replace or make overhauls of existing equipment. At present, more sustainable chemicals can struggle to compete on cost with more traditional chemicals, threatening their commercial viability and uptake.

It was noted that Government has a crucial role to play in shaping the economic incentives facing firms and consumers to help promote the transition from fossil resources – for instance through mechanisms such as taxes on non-sustainable chemicals and subsidies or tax incentives for sustainable ones. The Government can also promote the demand for more

sustainable chemicals through product labelling to help consumers make better informed choices about what they are buying, and through shaping public procurement standards.

3.4 Innovation and Technology Readiness

Innovation is critical to enabling defossilisation, as new ways of doing things need to be developed and deployed. At present, a number of the key technologies required are at an early stage of technology readiness and not deployed at significant scale. A number of general challenges were noted connected to scaling up the technologies needed for the defossilisation of the chemicals industry. In particular, there are challenges for innovations in navigating the “valley of death”, where projects have to move beyond their initial research funding to establish themselves commercially at scale. Participants also noted the challenge of innovations being ‘lost’ to other countries with more attractive business environments.

3.5 Workforce and Skills Development

The transition away from fossil resources requires a skilled and re-skilled workforce to be deployed , yet participants were concerned that the UK might not be able to call on a sufficiently large and skilled workforce to meet its needs and ambitions. There was particular concern over the supply of chemical engineers, who play a crucial role in designing, implementing and running many of the critical technologies and projects that will deliver defossilisation in practice. It was noted that people currently working in fossil-fuel dependent sectors have valuable transferable skills that could have a key role to play in supporting the transition, and should not be overlooked.

There was a discussion of the challenge of ensuring the workforce had the skills needed by industry. Firstly, it was noted that university curricula take significant time to change and evolve, making it more difficult for universities to be responsive to shifting industry demands. Secondly, it was noted that the Government does not have easy access to comprehensive data about what the skills requirements are of industry, making it harder for them to intervene effectively. Thirdly, participants agreed that there was a key role for organisations like IChemE to play in providing training and continuing professional development to its members, and also in helping provide government with insight into the developing needs of industry in this area.

3.6 Prioritisation of Chemicals and Processes

Participants had a range of views on the questions of which chemicals to prioritise for defossilisation, given scarce resources and scarce time. Some of the principles proposed to guide this decision included which chemicals could be produced most cost effectively, /generate the greatest profit, and which chemicals had the greatest potential for emissions reduction. Participants discussed whether to focus on bulk chemicals (which, given their scale, might offer significant emissions reductions but face economic barriers and intense

international competition) or specialty chemicals (which may have less overall impact on emissions but may provide higher value and a more differentiated market). There was also a discussion of the importance of waste valorisation as a priority, given the amount of carbon that could potentially be available. It was noted that the decision as to what to prioritise has to involve a long-term view of what feedstocks will look like in the future to know what technologies and options would be best.

4. Conclusions and recommendations

- The UK faces a decision about its aspirations for its chemicals industry. How much production capacity should the country have in the future, and what kind of chemicals should it be producing? These decisions have fundamental implications for the defossilisation of the chemicals industry.
- A clear, consistent and long-term policy framework and suitable incentives are crucial for supporting the defossilisation of the chemicals industry, and allowing businesses to invest in long-term solutions.
- Government should use the opportunity presented by the forthcoming industrial strategy to promote a unified policy and strategic direction on chemicals and defossilisation.
- Economic incentives play a crucial role in encouraging defossilisation, and Government has a central role to play in setting these up.
- Delivering defossilisation requires an appropriately large and skilled workforce. Without more chemical engineers, the UK risks not being able to make this transition effectively.
- The Government should prioritise chemical and process engineering education and training at all levels – supporting significant expansions in technical and apprenticeship, undergraduate and postgraduate, and post-doctoral routes.

About IChemE

The Institution of Chemical Engineers (IChemE) is the qualifying body and learned society for chemical, biochemical, and process engineers in the UK and worldwide, with over 31,000 members. Our mission is to champion the input of chemical engineers to create a sustainable future. We support our members in applying their expertise and experience to make an influential contribution to solving major global challenges, and are the only organisation permitted to award Chartered Chemical Engineer status and Professional Process Safety Engineer registration.

Find out more about IChemE and our strategic vision of Engineering a Sustainable World at icheme.org