

Delivering the UK's industrial strategy:

The crucial role of chemical engineering

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The role of chemical engineering in the UK's industrial strategy

The United Kingdom's Industrial Strategy sets out an ambitious vision of economic growth, innovation and an accelerated transition to a sustainable, net zero future. Central to achieving each of these objectives is chemical engineering, a discipline that applies science, mathematics, economics, and engineering design to transform raw materials into products essential to modern life, fuels and energy vectors. Chemical engineers design, implement and run the processes and systems that make this production happen efficiently, at scale, safely, and sustainably.

Contributions across key sectors

This broad field covers sectors from pharmaceuticals and food production to energy, advanced manufacturing, and environmental technologies. Chemical engineers are experts in scaling things up. A chemist or biologist may discover a promising new compound in a lab, but it is the chemical engineer who figures out how to make it in the quantities needed to actually put it to use, and who makes that production happen safely, efficiently and sustainably.

The contributions of chemical engineers are fundamental to the industrial strategy's priority sectors, including clean energy, life sciences, and advanced manufacturing. To take just a few examples: chemical processing inputs

form the backbone of roughly 95% of manufactured goods, the chemicals sector contributes around £30 billion in value annually and supports 140,000 jobs, and energy supply chains linked to chemical engineering add a further £176 billion in economic output.

Advancements in biopharmaceutical manufacturing and engineering biology rely on chemical engineering expertise to scale laboratory breakthroughs into commercial realities, underpinning a life sciences sector valued at over £19 billion. In advanced manufacturing, chemical engineering supports materials innovation and process optimisation, enabling domestic industries to remain competitive and resilient in global markets.

As well as growth, the industrial strategy also aims to pursue a number of environmental goals and the transition to net zero. Achieving these objectives depends heavily on technologies such as offshore wind, hydrogen energy, carbon capture, utilisation and storage (CCUS), where chemical engineers are critical to development, scale-up, and deployment.

Barriers to innovation, scale-up, and workforce growth

Unfortunately for the UK's aspirations for economic growth, the country falls behind when it comes to scaling up new innovations. Although we are world leaders in coming up with cutting edge research and new ideas, these new ideas are too often commercialised overseas

rather than here. To address this challenge, the UK must cultivate a supportive ecosystem with accessible pilot infrastructure to allow innovators the ability to work out how to scale up their projects in the UK.

We also need to do more to create an environment that encourages managed risk-taking and investment – the UK is often held back by an overly conservative attitude to risk that makes it harder to push forwards bold new ideas here. We also need more of the professionals who are experts in taking innovations to scale – chemical engineers. Not only do we need more chemical engineers right now, this need will only increase as we look to grow the economy and make it more innovative and sustainable.

Workforce development is a critical factor in delivering the industrial strategy. While the UK chemical engineering workforce is highly skilled and productive, it currently falls short in size and in terms of diversity – not just of gender but also regarding neurodiversity, socioeconomic diversity and diversity of thought. This seriously threatens the delivery of the industrial strategy. With many experienced engineers approaching retirement, there is an even greater need to expand recruitment and broaden access.

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DiscoverChemEngLIVE showcase at our UK headquarters to mark Tomorrow's Engineers Week. The event brought together 400 students aged 11–18 from local schools and colleges, offering them the chance to connect with a diverse group of engineers and scientists from leading employers and universities, and explore the wide-ranging opportunities in chemical and process engineering.

decisions of the next generation. It also means addressing misconceptions about working in industry – such as thinking that “there’s no industry here in the UK” or “jobs in industry are dirty and unpleasant” – and helping people see the transformative role that engineering has to play in tackling the big challenges of the day such as climate change. And it also means helping people see that engineering skills are ones that can set them up for a successful career in a wide variety of sectors. The life sciences sector gives a clear example of these challenges: just 9% of people working in the field are from working class backgrounds despite the fact that as an industry it produces products that are used across the population.

To address this workforce challenge we need to expand vocational routes, apprenticeships, and drastically increasing access to the industrial placements that are so vital to cultivating practical interdisciplinary skills. We must support all non-traditional routes into engineering.

There are also challenges facing our higher education system which threaten its ability to deliver skilled workers and novel research. Current funding constraints and a reliance on cross-subsidy from international students pose challenges for STEM subjects with

significant laboratory components such as chemical engineering, as they are more expensive to deliver.

International competition and policy stability

These workforce challenges have an international dimension as well, as the United Kingdom has to compete both to attract skilled international workers and to retain its home-grown talent. We often hear of the challenges that companies face recruiting international talent, such as competition for a small number of internationally skilled workers in particular fields, as well as barriers such as visa restrictions which make it harder to attract talent to the country.

The visa system is particularly challenging for SMEs and individuals to navigate, and important opportunities such as the Global Talent Visa are under-utilised due to a lack of awareness. To attract and retain the skilled workers that it needs, the UK has to ensure that it, and its companies, are able to provide opportunities that are attractive when compared to those available in other countries. It needs to ensure that the visa system is both easy to understand and navigate.

Attracting investment to the UK, which is vital for the success of the industrial strategy, hinges on allowing businesses to

make long-term plans and reducing their uncertainty about the future. The UK has had a number of years of political uncertainty, but what industry needs is a clear and consistent long-term vision for the country so that they can make plans for the future with confidence.

We consistently hear from industry about how stability and clarity in government policy, funding, and regulation are so important. Long-term, stable investment and strategic planning spanning decades are essential for capital infrastructure, training programmes, and apprenticeship schemes to ensure the UK remains competitive for talent and investment.

The path forward

Delivering the industrial strategy demands addressing the intertwined challenges of innovation scale-up and risk taking, drawing more talent into the STEM workforce through greater diversity and inclusion, and creating the right policy framework to let businesses make long term investment decisions with confidence.

Chemical engineering’s unique blend of multidisciplinary expertise and practical scaling experience makes it a linchpin for the success of the strategy – we look to the government to play its part in helping the profession make the biggest possible contribution.