

Research on the safety of Net Zero technologies, with a focus on hydrogen and CCUS

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The Health and Safety Executive (HSE) Strategic Objective for Net Zero, as outlined in the *People and Places Strategy*, emphasises the need to support the safe transition to a low-carbon economy through effective regulation, underpinned by robust science and evidence. Net Zero technologies encompass a broad and rapidly evolving agenda; it is therefore critical for HSE to understand the innovation landscape, technological readiness, and the capability and competence of industry to develop and deploy these technologies safely.

HSE continues to utilise science and research to underpin policy development and regulatory frameworks, ensuring that emerging risks are identified and managed proportionately. As Net Zero technologies are being developed and deployed internationally at pace, it is essential for HSE to draw on globally available information – including incident data, research outputs, operational experience, and findings from research prioritisation exercises – to inform its approach and maintain regulatory effectiveness.

While early efforts have focused on developing the knowledge base for Carbon Capture Utilisation and Storage (CCUS) and hydrogen, HSE has also undertaken extensive research in related areas such as battery technologies. This presentation, delivered at the IChemE Hazards 2026 conference, plans to review the current landscape of scientific research on the safety of Net Zero technologies and examines how emerging evidence is shaping HSE's research priorities.

Given the breadth of the Net Zero agenda, the presentation focuses on hydrogen and CCUS as key areas of interest. It summarises findings from research prioritisation exercises conducted by HSE and other organisations and maps the scope of current and planned research initiatives across both industry-led and HSE-led programmes. The processes used by HSE to identify, review, and update its research priorities are also outlined, illustrating how regulatory responses are evolving in line with a rapidly changing evidence base.

Recognising that Net Zero research is developing quickly, this work provides a snapshot of the current landscape at a single point in time. Nevertheless, this high-level overview offers an opportunity to reflect on existing and future research priorities and to explore opportunities for collaboration to support the safe and effective deployment of Net Zero technologies.

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