



Department for
Energy Security
& Net Zero



Hydrogen Skills
Alliance



Carbon Capture Skills Framework

2026



Contents

Capture Plant Roles



Transport and Pipeline Operations Roles



Geological Storage Operations Roles



CO2 Shipping, Ports and Terminals Roles



Capture Plant Roles

Process Operator L3
 Mechanical Fitter
 E&I Technician
 Instrument Technician
 Electrician (Industrial)
 Lubrication Technician
 Hydraulics & Pneumatics Technician
 Control Technician/Software Technicians
 Maintenance Supervisor
 Head of Maintenance/Control
 Health & Safety Managers (may be advisory)
 Environmental & Quality Managers
 Operations Manager/Plan Manager
 Commercial Manager
 Project Manager
 Planner (Manufacturing)
 Scheduler (Manufacturing)
 Mechanical Engineer L6
 Electrical Engineer
 Process Engineer
 Reliability Engineer

	Theme	Knowledge Statement	Technical Roles								Higher Technical Roles								Professional Roles					
44	Process Safety, Design & Contextualised Knowledge System Integration & Interdisciplinary Working	Understand the interfaces between process, mechanical, civil, electrical, and geoscience disciplines in CCS project delivery, including integration of control systems between emitter EPC and CCS EPC contractors and challenges with flexible operation (e.g. intermittent power, industrial load variation etc.)								✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
45	Process Safety, Design & Contextualised Knowledge Decommissioning & Lifecycle Management	Understand planning for end-of-life activities, de-pressurisation, well plugging, and post-injection monitoring, including management of accumulated wastes/solvent degradation materials and longterm responsibilities for environmental performance.								✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

Transport and Pipeline Operations

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	Theme	Knowledge Statement	Technical Roles								Higher Technical Roles								Professional Roles						
1	Carbon Capture Industry UK Net-zero targets, industrial decarbonisation, and legal frameworks	Understand the role of CCS in achieving UK net-zero targets, its integration with industrial decarbonisation pathways, and relevant UK legislation, including the Energy Act and Net Zero strategy.																							
2	Carbon Capture Industry CCS value chain and system overview	Understand the complete CCS value chain from capture to storage, including key process steps (capture, compression, transport, and geological injection) and how these are integrated within industrial clusters.																							
3	Carbon Capture Industry EPC & system integration	Understand the operational interfaces between the emitter and the Carbon Capture and Storage Operator, including control system integration, dynamic operation, boundary management, and coordinated outages.																							
4	Carbon Capture Industry Sectoral applications and integration	Understand how CCS applies across key sectors (power, cement, steel, hydrogen, and waste to energy) and contributes to both emission reduction and carbon removal.																							

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5	Carbon Capture Industry Decarbonisation alternative & technology choices	Understand sectoral decarbonisation routes and how CCS is selected based on criteria such as footprint, energy use, utilities availability, CO2 transport access, and integration with the emitter.																				
6	Carbon Capture Industry CCS clusters and regional development	Understand the UK CCS cluster approach (e.g. HyNet, East Coast, Acorn), their geographic distribution, and the economic, employment, and levelling-up benefits associated with regional deployment.																				
7	Carbon Capture Industry Supply chain and infrastructure requirements	Understand the infrastructure and supply chain requirements for CCS, including pipeline networks, fabrication, offshore platforms, and storage site development.																				
8	Carbon Capture Industry Supply chain lead times and domestic capability	Understand major CCS equipment, typical lead times, national manufacturing capability and import dependencies.																				

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9	Carbon Capture Industry Connections with other low-carbon technologies	Understand how CCS interfaces with hydrogen production, BECCS, and DAC technologies to form part of an integrated net-zero system.																										
10	Carbon Capture Industry Stakeholders and governance structures	Understand the roles of key organisations (e.g. NSTA, HSE, CCSA, DESNZ, EA, SEPA, NRW, NIEA) in CCS regulation, project delivery, and oversight.																										
11	Carbon Capture Industry Process context for technicians (mechanical, electrical and process)	Understand basic plant layout, major equipment system boundaries, isolation points and control principles required for safe operations and maintenance (O&M) activities.																										
12	Carbon Capture Industry Climate resilience	Understand how climate resilience considerations including heatwaves, flooding, high winds, drought and extreme weather can affect the safe and reliable operation of CCS systems. This includes awareness of the vulnerability of capture plants, pipelines and storage sites to climate impacts and measures to increase operational resilience.																										

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13	Carbon Capture Industry Community, stakeholder and societal engagement	Understand how transparent, timely and two-way engagement with local communities and stakeholders builds trust, addresses perceived risks and supports fair participation. Recognise how CCS can deliver local economic, social and environmental benefits and apply engagement approaches that reflect community context and support long-term confidence.																				
HAZARDS, RISK AND CONTROLS																						
14	Hazards, Risks and Controls Risk and hazard identification	Understand the differences between risks and hazards in CCS operations and apply structured methodologies such as HAZID, HAZOP, and QRA to identify and control them.																				
15	Hazards, Risks and Controls CO2 properties and process hazards	Understand CO2 chemical and physical properties (e.g. density, phase behaviour, impurities) and the implications for system design, safety, and material selection. Understand CO2 specification requirements across the value chain and how impurities influence operability, corrosion and custody transfer.																				

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29	Legislation & Regulation Monitoring, Reporting and Verification (MRV)	Understand MRV obligations, ISO standards (e.g. ISO 27914/27916), and the importance of transparent reporting for emissions and storage data.																		
30	Legislation & Regulation Carbon accounting and markets	Understand how CCS interacts with carbon markets, including the UK ETS, carbon crediting mechanisms, and approaches to permanence verification.																		
31	Legislation & Regulation Roles of regulators and oversight bodies	Understand the responsibilities of NSTA, HSE, and the Environment Agency in ensuring safe, compliant CCS operations.																		
32	Legislation & Regulation Post closure liability and stewardship	Understand post-closure monitoring requirements, transfer of liability processes, and long-term site stewardship responsibilities.																		

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PROCESS SAFETY, DESIGN AND CONTEXTUALISED KNOWLEDGE				
33	Process Safety, Design & Contextualised Knowledge Process safety management systems	Understand the principles of process-safety management and their application across capture, transport, and storage facilities including human factors, behavioural safety, and learning from incidents and near-misses.		
34	Process Safety, Design & Contextualised Knowledge Incident prevention and management	Understand root-cause analysis, safety barriers, and emergency-response integration within CCS operations, including major outage management, isolation procedures, permit-to-work systems, and restart protocols.		
35	Process Safety, Design & Contextualised Knowledge Maintenance & Inspection	Understand inspection, testing, and preventive maintenance schedules for CO2 equipment and pipelines, including coordination of maintenance windows, understanding downtime implications and alignment with emitter operations and maintenance (O&M) schedules.		

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39	Process Safety, Design & Contextualised Knowledge CO2 Transport Infrastructure	Understand design and operation of pipeline networks and CO2 shipping systems, including flow assurance, pressure management, and logistics coordination and CO2 specification and custody transfer requirements.																				
40	Process Safety, Design & Contextualised Knowledge Geological Storage & Site Characterisation	Understand reservoir modelling, caprock integrity assessment, & geochemical interactions controlling CO2 containment, including buffer storage concepts and requirements for temporary storage design.																				
41	Process Safety, Design & Contextualised Knowledge Well Design, Drilling & Injection Operations	Understand well construction, completion, injection control, integrity monitoring, and abandonment practices for storage sites.																				
42	Process Safety, Design & Contextualised Knowledge Construction & Commissioning Trade	Understand competencies in welding, pipefitting, fabrication, and commissioning of CO2 systems using specialist materials and procedures, including utility tie-ins and integration with emitter systems where utilities or water treatment must be imported from elsewhere on site.																				

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43	Process Safety, Design & Contextualised Knowledge Monitoring, Verification & Digital System	Understand digital twins and sensor networks for continuous monitoring and verification of CCS infrastructure including cybersecurity considerations for process control systems.																				
44	Process Safety, Design & Contextualised Knowledge System Integration & Interdisciplinary Working	Understand the interfaces between process, mechanical, civil, electrical, and geoscience disciplines in CCS project delivery, including integration of control systems between emitter EPC and CCS EPC contractors and challenges with flexible operation (e.g. intermittent power, industrial load variation etc.)																				
45	Process Safety, Design & Contextualised Knowledge Decommissioning & Lifecycle Management	Understand planning for end-of-life activities, de-pressurisation, well plugging, and post-injection monitoring, including management of accumulated wastes/solvent degradation materials and longterm responsibilities for environmental performance.																				

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