Summary
Carbon capture and storage (CCS) is capable of reducing atmospheric emissions of greenhouse gases from coal or gas-fired power plants. The upward buoyancy of dense-phase carbon dioxide (CO₂) in deep reservoirs means that sites need to be chosen with a methodology that carefully evaluates details of performance during and after the injection process. Standard methods of site evaluation for saline aquifers overwhelmingly focus on the aspects of geological containment and monitorability. Also important to storage-site performance is the engineering design of transport and injection. Transport to storage in offshore saline aquifers is normally expected to be by pipeline. There are several proposed methods of CO₂ injection: for example, as a dense phase, in the liquid or supercritical phase, as water-alternating-gas cycles, or as carbonated brine. These result in different migration pathways in the aquifer during the short term (1 to 50 years) and different storage distributions in the long term (1,000 to 10,000 years). To develop a methodology suitable for making informed decisions for aquifers offshore of the UK, several of these different methods are being evaluated. A chemical-engineering and reservoir-engineering approach will be used to define some of the important surface-transport and subsurface interactions. Important surface features may include the energy balance, location, sizing, materials specification, and costing of surface equipment for mixing and transporting CO₂.

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