



## Carbon capture, transport, and storage in Europe – four key questions answered

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Europe has a big task on its hands to deliver carbon capture and storage, with transport a key challenge. Here's a look at the state of play.

### **What is the status of CO<sub>2</sub> capture, transportation and storage (CCTS) in Europe today?**

Transportation is the missing link at present. Geological storage schemes are coming onstream. But the importance of infrastructure development in pipelines, port terminals, shipping and rail to move the CO<sub>2</sub> from emitters to sequestration sites is still severely underappreciated.

### **What will the mix of infrastructure components required for transporting and storing CO<sub>2</sub> look like in Europe?**

A supercritical CO<sub>2</sub> pipeline network will be best – and cheapest for overland. However, there are no common standards for required CO<sub>2</sub> purity or pipeline pressure. So that means the convergence of various pipelines and pipeline networks in the future may be difficult. Shared infrastructure is essential and will require a harmonised and a shared vision across continental Europe, which we do not yet have. Between now and when any pipeline network is available, rail transportation of liquid CO<sub>2</sub> will be needed. The question then is what happens to rail tanker assets when a route receives a pipeline. Will they be cascaded to another route? This investment in rail cars is a 20-year commitment. Whoever funds that will want to know there is cashflow security for the whole period. Shipping of liquid CO<sub>2</sub> is appropriate and cost-effective for non-overland routes but it requires the development of shared terminals (CO<sub>2</sub> and hydrogen) and a much higher degree of standardisation on the purity, temperature and pressure of the liquid hydrogen that will be shipped. Without this, shared infrastructure such as terminals and geological storage sites will not work.

### **What are the commercial challenges facing CCS transportation and storage in Europe?**

The main commercial hurdle is the massive investment that will be required in the shared infrastructure. This capital cost must be sunk before diverse revenue streams come together to pay for it. The shared infrastructure is likely to be underutilised from day one, despite the capital expenditure being fully committed. Therefore subsidies may be required until critical mass has evolved. This is similar to some governmental proposals to support hydrogen pipeline startup in Europe and underpin the long-term development of the European Hydrogen Backbone.

### **What are the main policy drivers, such as emissions targets or government subsidies that will shape CCTS in Europe?**

The EU CO2 emissions trading scheme (ETS) and the associated cost of CO2 emissions certificates within that drives one side of the business case for CCTS. The costs of CO2 capture, transmission and storage are the other side. From here, the main policy focus must be on enabling the shared infrastructure to develop in a harmonised way, and supporting its early years of under-utilisation. Other short-term subsidies are nice to have but are not material in the context of how much investment will need to flow into this sector over the next 15 years. Focus is essential to ensure that the EU coordinates the essentials and allows the private sector to get on with the CCTs infrastructure deployment within appropriate guiderails.

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