

The biggest problem with “clean coal”: scope

“Clean coal” is a euphemism for coal powered electricity in which carbon capture and storage of CO₂ takes place (CCS). By the end of 2016, CCS facilities in operation will be able to capture and store just 0.1% of the world’s CO₂ emissions. Let’s put aside issues of large cost overruns on recent projects²⁹, the Department of Energy withdrawing support from several large projects (FutureGen in Illinois), project cancellations in Europe, legal uncertainties about liability associated with CO₂ leaks, evidence of leakage and earthquake risk from CCS operations in the Middle East and the North Sea, and the ~30% energy drag on coal facilities required to perform CCS in the first place.

Let’s assume that all of these problems can be solved via technological innovation and legislation (an aggressive assumption, for sure). The bigger problem with CCS is the scope required to make a difference. To see why, let’s assume the world aims to sequester just 15% of global CO₂ emissions.

- In 2015, global CO₂ emissions were 33.5 billion tonnes
- To sequester 15%, that would mean capturing, transporting and burying 5.0 billion tonnes of CO₂
- That amount of CO₂ by *weight* is equivalent to **6.3 billion cubic meters of CO₂** by *volume* (assuming 0.8 tonnes per cubic meter of CO₂ when compressed)
- How much volume is that? Global crude oil extraction in 2015 was 4.4 billion tonnes by weight, which is equivalent to around **5.1 billion cubic meters of oil** by volume

Compare the two bolded numbers above, and you can see the problem. Even capturing a small portion of global CO₂ emissions would require a CO₂ compression/transportation/storage industry whose throughput is even greater than the one used for the world’s oil transportation and refining, which has taken 100 years to build (see map); and that’s without the benefit that oil provides as an energy input to vehicle transportation and industry. There may be applications where CCS makes sense (enhanced oil recovery, and meeting small amounts of commercial CO₂ demand). But as a big picture solution to CO₂ emissions, CCS infrastructure needs and costs are very daunting.

Global oil pipeline and refining networks



Source: Rextag. November 2016.

²⁹ According to the *New York Times*, the Kemper clean coal plant in Mississippi is more than two years behind schedule, more than \$4 billion over its initial budget of \$2.4 billion, and still not operational.