

It is understood and accepted that CO₂ capture and storage (CCS) is one of many options to mitigate the effects of climate change, however it is one of a few that have the potential to offer deep cuts in emissions. There remain some questions and uncertainties over the costs involved, and this information sheet aims to address these costs, and put them into context.

Why is CCS Expensive?

All new technologies, or new applications of existing technologies are expensive at first, and then reduce over time. Think of buying a mobile phone: when mobile phones were first available, the handsets were extremely expensive, but over time, as the technology becomes more established and widespread, newer handsets are developed at a cheaper cost. CCS can be seen to operate in a similar manner. First demonstrations will cost more, but once established, the ongoing costs will not be as high.

For the first developments the costs will be recognisably higher, but over time, as the technology is modified, improved and generally streamlined, these costs will reduce. The initial costs will more than likely be swallowed either by the energy company, or covered by government grants or subsidies. It should also be noted that some sources suggest the costs of not deploying CCS could be up to 9 times higher through increased insurance costs due to more severe weather events, increased costs of food production and other impacts of unmitigated climate change.

What Are the Costs?

Quite simply, the costs involved in CCS either apply to capture, transport or storage. Capture costs are incurred by the physical machinery and equipment needed to capture the CO₂. A one off cost at the start of a development and the ongoing costs for the actual capture; i.e. the chemicals or additional elements used in the capture process (solvents in post-combustion capture, oxygen in oxyfuel combustion and steam in pre-combustion capture).

These costs vary; the oxygen is produced using some specialist equipment, so this is primarily an up front cost, the solvents in post-combustion capture can be re-used to a certain degree, and the steam production for pre-combustion capture is the primary ongoing cost for this method.

Transport costs are simple to predict as gas transport by pipeline, truck or ship is already carried out all around the world, and the costs of transporting gases over distance are known. There is a possibility of a cost reduction in this part

of the chain as pipeline infrastructure reuse is a possibility; using gas pipelines that transported natural gas from a gas field to a processing facility to transport the captured CO₂ to a storage formation.

Storage costs are less simple to predict; drilling of new injection wells is a costly process, possibly minimised by converting existing production wells (in the case of oil and gas field storage) into injection wells. Although a great deal is known about the drilling of wells, observation, monitoring and exploration of potential storage sites can add substantially to the cost of a project. As time goes on and more is known about large-scale storage, these costs will be expected to reduce.

What Do We Know About Costs?

To a certain degree, we don't know a great deal about firm costs, this is because there isn't a large-scale capture and storage project in operation. Many projects are underway at smaller scales, and this is an area that is under constant development.

Some Europe-wide initiatives are in place to share data and information as it becomes available, and as an example, the UK government carried out extensive initial work in determining the feasibility of a proposed project in Scotland. The project was cancelled, but the information has been made publicly available to any parties looking at similar projects.

Summary

While firm data is currently unavailable, or unreliable for costs, it is clear that there is a great deal of knowledge and experience that can be applied to CCS. It is hoped that as more information becomes available, the variations in cost estimates will reduce, and a clearer picture will be developed.

What is clear is that CCS will cost money, however this will likely not impact greatly on consumers and the costs of not deploying CCS would likely be much higher.