

Factsheet 17: Controversies – carbon capture and storage

Carbon capture and storage is a way of maybe almost eliminating CO₂ emissions from coal fired power stations. But there is controversy over whether it will work. This factsheet puts the arguments for and against.

Carbon capture and storage (CCS) is also called 'carbon sequestration' and 'clean coal'. It works like this. As the exhaust fumes full of CO₂ leave the power station, they pass through 'scrubbers'. The scrubbers capture almost all the CO₂ in the fumes. This is the 'capture'.

The CO₂ is then turned from a gas into a liquid under pressure. That liquid is sent down a pipeline to a place where the CO₂ can be stored forever. Different storage places have been suggested – old oil and gas fields, old coal mines, and undersea caverns.

Old coal mines are leaky. But oil and gas fields seem less so. After all, they have held the oil and gas for millions of years. Indeed, carbon dioxide is already injected into oil and gas fields for commercial reasons. The CO₂ increases the pressure in the well, and forces more oil and gas to the top.

It is also possible to use carbon capture and storage in other processes, but the major proposed use is in coal power stations.

The argument for carbon capture and storage is simple. It makes coal use possible. Coal is cheap. There are still large reserves in many parts of the world. Many workers depend on mining – miners, but also power station workers and rail workers. If the CO₂ can be taken out, we can use the coal.

This is a simple argument. That does not mean it is wrong.

Doubts

There is general agreement that the capture part of carbon capture and storage works. There are several demonstration projects in different parts of the world. They work.

There is argument about whether the storage part works or not. Several experimental projects in the world now store CO₂. One, using an underground cavern in the sea off Norway, has been operating for years. They seem to work.

However, there are question marks about the future. We simply do not know if most potential storage places will leak.

Small leaks would make a large difference. For instance, if a cavern lost 1% of its CO₂ each year, it would have lost half of the CO₂ in 50 years.

This would be ok if there was not much carbon capture and storage was rare. But if CCS works, there will be a lot. If 40% of global energy comes from burning coal with CCS, and half of that eventually escapes, then the emissions will be far more than if we just used renewable energy instead. The danger is that CCS could make us feel safe, and once the leaks surfaced there would be no going back.

However, the largest difficulty seems to be neither capture nor storage, but moving the CO₂ from capture to storage. Very large amounts of energy have to be used to pressurise and move CO₂ long distances down a pipeline. But very few power stations are near an undersea cavern or old oil field.

Why no CCS power stations yet?

There is another question. CCS technology has been intensive development for more than a decade. Why are there no working power stations anywhere using CCS?

There are small demonstration projects in parts of coal fired power stations. There are demonstration projects in experimental plants that are smaller than a normal power station. And there are projects storing CO₂. But there is no working power station yet of normal size that uses CCS for all its power. Why?



One possible reason is money. CCS is expensive. Estimates of the extra expense vary, from 15% to almost double the cost of building and running a normal power station. And power stations are already very expensive to build. It is also possible to retrofit scrubbers to old power stations, but this is even more expensive.

It is possible that CCS already works, but that power companies do not want the very considerable extra expense, so they have not built CCS. No one is forcing them to, and it does not make financial sense to them.

In that case, they are waiting until it becomes much cheaper. But technologies only become cheaper if they are manufactured over and over again.

There is another possible explanation. Many supporters of CCS, and many engineers involved with CCS, say the technology will work, but does not work now on any affordable scale.

If this is the case, it will take 20 to 40 years before CCS works for all power stations. That means CCS is not a solution now, so we need other solutions now. After all, we need change during the next twenty years, starting now, not in the far future. But CCS may be a solution at some point in the future.

Greenwash?

Some opponents of CCS subscribe to another explanation of what is happening. They say that clean coal is a smokescreen designed to justify continuing to use coal.

The point to the way that many new power plants are described as 'CCS-ready'. This means that scrubbers and pipelines could be fitted in the future. They are just not there now. It makes a high carbon option sound almost low carbon.

Similarly, the UK government in 2009 insisted that a power station be part CCS, trapping at least 10% of the CO₂. This is like telling your mother that you have cleaned the kitchen floor and now it is only 90% dirty. Interestingly, the power company involved, EON,

refused to build the power station unless they had a government guarantee that it would never be required to be fully CCS.

In this understanding, critics argue that coal companies and power companies either don't believe CCS will work, or don't ever plan to use it. They are just buying time.

No one is saying that all the engineers involved in developing clean coal are lying. But they may be overly hopeful about the long term possibilities, and unclear about the motivations of company executives.

There are also large numbers of people who are not sure, but desperately want carbon and storage to work.

A possible compromise?

There is a possible compromise between supporters and opponents of clean coal. This is an agreement that the government should require all new power stations to be fully CCS. And all old power stations to be within 10 years – otherwise you get the situation with oil refineries in the US. There all new refineries have to obey strict environmental rules, so the oil companies don't build any, and keep expanding the old refineries.

This compromise, if enforced, would show us whether CCS works. The power and coal companies would also have to speed up the process of research and innovation. And if it did not work, coal plants would close and coal emissions cut to nothing.

There is one possible catch to this compromise. What if CCS works, and the pipelines work, but the storage leaks?

This is part of a series of factsheets on climate change produced by the ITF, www.itfclimatejustice.org