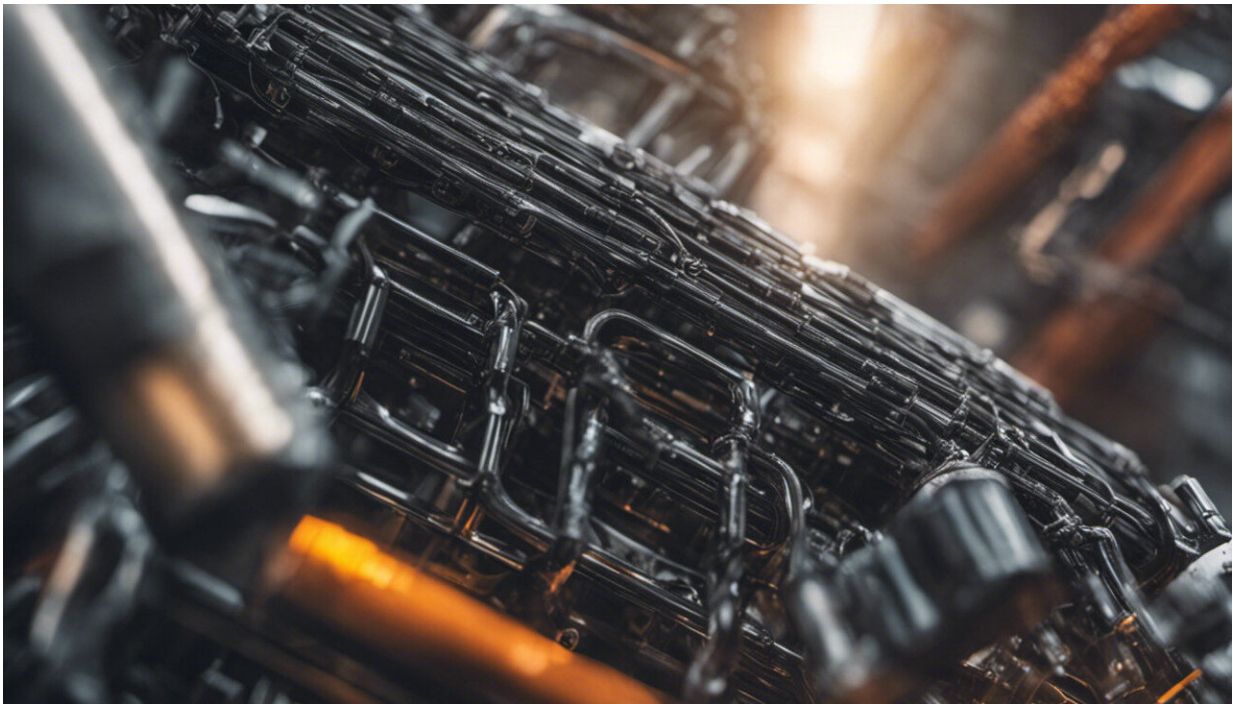


Does carbon capture and storage hype delay emissions cuts? Here's what research shows

March 31 2023, by Nils Markusson



Credit: AI-generated image ([disclaimer](#))

Is carbon dioxide capture and storage (CCS) an important tool for slowing climate change, or merely a way to justify the continued extraction and burning of fossil fuels? I'm a social scientist who studies the politics of environmental technology and I have given this question a lot of thought.

CCS is a technology that can separate out [carbon dioxide](#) (CO₂) from industrial facilities, like a coal-fired power plant or a cement factory, and sequester the CO₂ underground so as to keep it out of the atmosphere.

The technology works and has been demonstrated to some effect on industrial plants. CO₂ storage underground has been demonstrated in Norway [since the 1990s](#). A lot of energy and water is used to do this and there is no market for the stored CO₂ in the UK. This means CCS will not be commercially viable without policies such as a legal mandate for companies to use it.

The UK government's climate [policy](#) is defined by the concept of "net zero." This entails phasing out emissions and scaling up methods of removing CO₂ from the atmosphere to reach a point where sources and sinks of the gas are balanced. Some emissions, such as those from steelmaking, are often expected to be hard to eliminate in the time left to avert catastrophic warming. Governments propose compensating for these by neutralizing emission sources with CCS or creating artificial sinks with so-called carbon removal technologies, like direct air capture—another rudimentary technology which involves drawing CO₂ from the air.

A [high court ruling](#) in 2022 ordered the government to outline how its policies will meet the legally binding target of reaching net zero by 2050. The government has now released its [revised plans](#) which will include storing CO₂ below the North Sea using new carbon capture sites in Teesside, funded with £20 billion (US\$24.7 billion) over 20 years. The government may also license a large new oilfield in the North Sea called Rosebank.

Is this an example of CCS being used to delay real cuts in emissions as some have [alleged](#)? A recent [paper](#) published by myself and fellow

researchers offers some insight by reviewing decades of research on the topic.

What do studies say?

So far, critics seem to have a point. CCS has been very slow to get off the ground and successive UK governments have botched attempts to demonstrate the technology at scale.

Our research traced the debate back to the 1990s when economists first modeled how emissions reductions might be substituted with carbon removal technology to reveal the cheapest way to decarbonize. This aroused interest in carbon removal (and solar radiation management, which involves bouncing the sun's energy back to space) technology, but the results were controversial as even then climate scientists were wary that they could replace vital cuts to emissions.

The problem of whether carbon removal actually deters or delays emission reductions has been conceptualized and studied in multiple ways by academics. Few deny the risk altogether, but conclusions vary as to how serious it is.

Some studies look at integrated assessment models—complex computer models of the climate system which use economics to describe how emissions might change depending on the technologies used to handle them. These studies tend to find that introducing the option of carbon removal into projections of how countries can decarbonise does indeed substitute emissions reductions to some extent. Authors disagree on how relevant these findings are to what happens in the real world. But we know from other studies about the performative effects of modeling studies: their findings tend to shape policy, and so real-world outcomes, meaning results showing substitution effects should not be dismissed.

A large number of studies assess the allure of CCS on individuals by, for example, asking policy makers or members of the public about the kinds of decision they would make or would like to see made. These studies are among the most skeptical about the risk of CCS acting as a deterrent to cutting emissions, with some even suggesting an opposite effect.

Political economy matters

In our review, we argued that it is in these cases where the relevance of experimental results for real-world outcomes must be taken with a pinch of salt. These methodologies tend to assume that individual preferences are what matters in shaping climate policy, and that rational calculations by people concerned with finding the most efficient solution to a problem determine what decisions are made. We argue that any number of social, cultural, political and economic processes make the world much messier than that.

Structural accounts of the role of CCS aim to take such processes into account. These studies tend to find stronger support for CCS delaying and deterring [emissions reductions](#) by considering the context created by political economy—that is, the influence of powerful economic interests on political systems and government policy. Most of these studies are, to date, highly theoretical, and more empirical assessments are needed, including [case studies](#) which analyze the processes governing the creation of particular policies.

While the new government plan was billed as an "energy security strategy," it contains no significant proposals to insulate leaky houses, which experts have consistently argued would reduce demand for foreign sources of energy, cut household emissions and alleviate bills. This would have been a reasonable priority during a so-called cost-of-living crisis. But home insulation does nothing to shield the profits of fossil fuel companies or landlords in the large and growing private rental

sector.

When the [political economy](#) in which climate policy making happens is considered, the repeated role of CCS so far is revealed: a handy excuse to delay reform and protect the profitability of powerful sectors of the economy.

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