

Carbon Capture & Sequestration Do Not Rely Fully For Achieving Net Zero Targets

Why In News

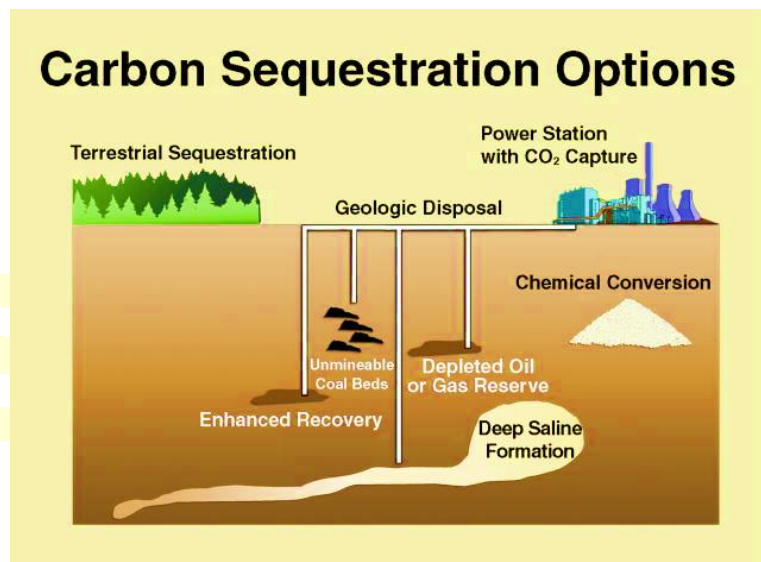
- The idea that all **the problematic carbon dioxide emissions** in the future can be safely and permanently buried in the ground with carbon capture and sequestration (CCS) technologies might be **extremely misplaced and impractical**, a new study by researchers of **Oxford University and Imperial College in London** suggests.



What Is CCS

- CCS involves the **capture of carbon** from the source of emissions, like a power plant or a cement factory, and storing it below the ground in suitable geological structures such as **depleted oil or gas reservoirs** or some specific rock formations to prevent the release of these carbon emissions into the atmosphere.
- **Approaches:** Carbon capture and storage (CCS) encompasses two primary approaches:
- The first method is known as **point-source CCS**, which involves capturing CO₂ directly at the site of its production, such as industrial smokestacks.
- The second method, **direct air capture (DAC)**, focuses on removing CO₂ that has already been emitted into the atmosphere.

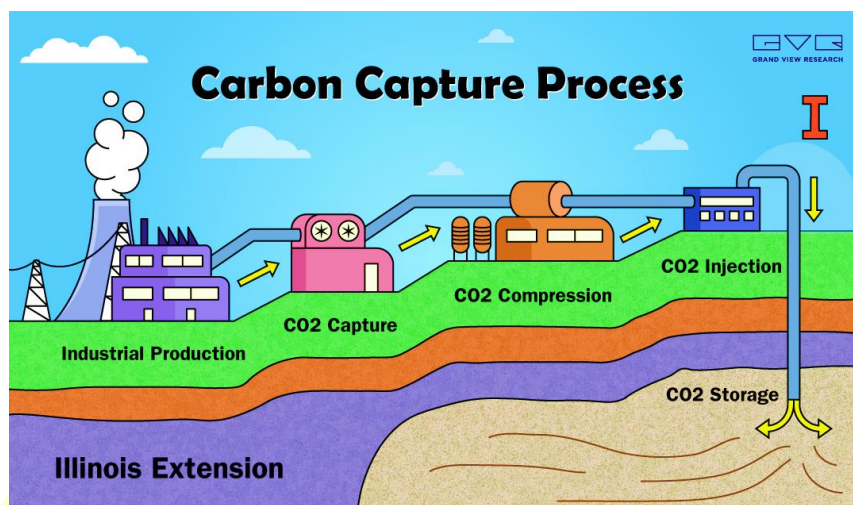
- The recent UK initiatives specifically target point-source CCS.
- Carbon capture and storage encompasses several distinct steps, each contributing to the effective containment of CO₂ emissions:
- **Capture:** CO₂ is isolated from other gases generated during industrial processes or power generation.
- **Compression and Transportation:** Once captured, CO₂ is compressed and transported to designated storage sites, frequently through pipelines.
- **Injection:** The CO₂ is then injected into subterranean rock formations, often situated at depths of one kilometer or more, where it remains stored for extended periods, sometimes lasting decades.



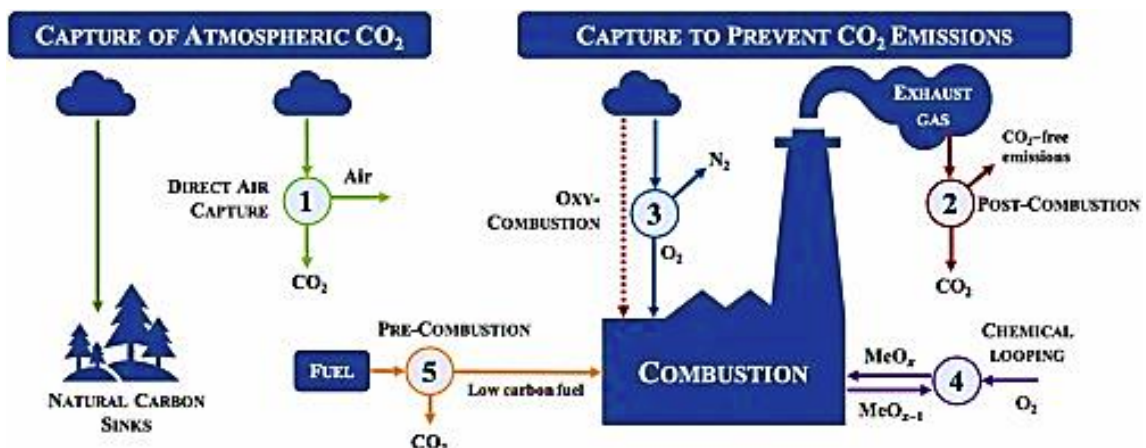
What Does Study Says

- All **net-zero emissions pathways to 2050** put forward by the **Intergovernmental Panel on Climate Change** involve some deployment of **CCS technologies**.
- There are currently **no projections** which make the world net-zero without some sort of carbon capture and sequestration.

- Emission pathways that require the world to put up to **20 billion tonnes** of carbon dioxide underground in 2050 to achieve net-zero could **cost at least US\$ 30 trillion** more than the pathways in which only about 5 billion tonnes have to be stored.
- “This can be prohibitive. As mentioned in the study, these are expected to be the **lower end of the estimates**.”

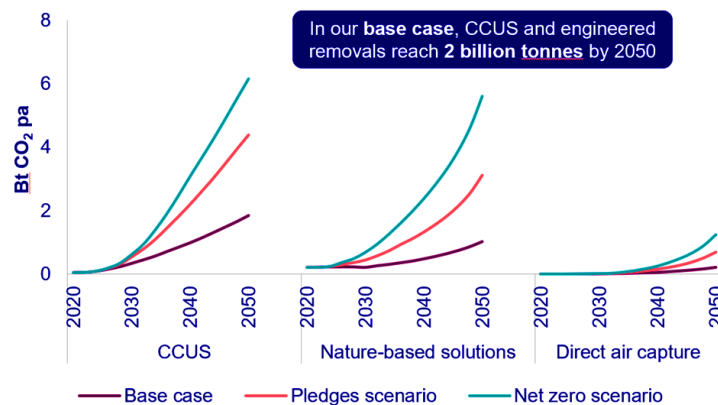


- The **actual cost** differential between the high-CCS and low-CCS scenarios could be much higher.
- And this makes it extremely unattractive and **damaging economically**, if not totally impossible,”.
- “A **blanket use of CCS technologies**, as a solution to rising emissions, must not be relied upon. Frankly, that is not even an option.
- Significantly, the study found there had been **no cost reductions** in any part of the CCS process as the technology progressed in the last 40 years.

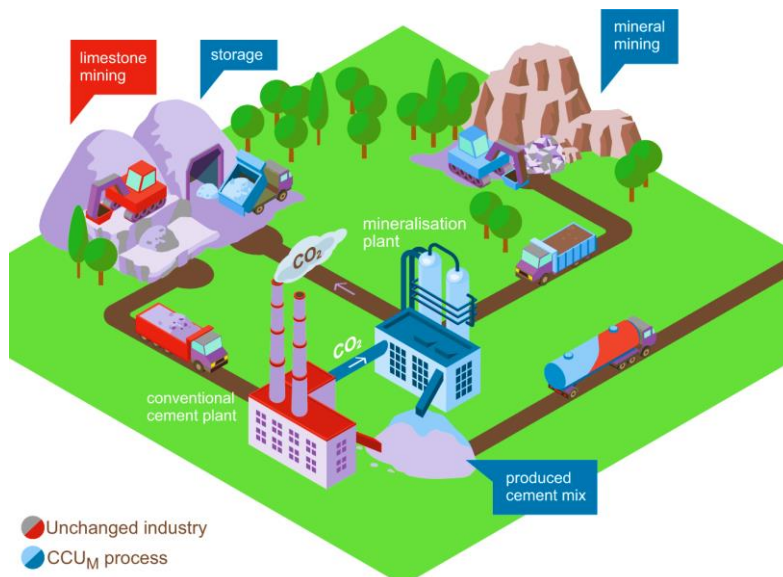


- Not all technologies undergo rapid cost reductions. The cost of nuclear power, for example, is now rising, if anything. The cost of hydropower is rising slightly. The ones where you see rapid cost reductions are the ones you can produce in volume, which does not apply to CCS technologies.
- So, even if the **CCS technologies are scaled up** from the current installations, it is unlikely to bring down the costs. At least that is what we have found with past trends,”.

Carbon capture and removals – by scenario



- As of now, all CCS projects around the world have a combined capacity to put away about **49 million tonnes of carbon dioxide emissions**. That is just about one-thousandth of the annual CO₂ emissions.
- “The fact that **governments are not rapidly scaling up CCS technologies** means even they realise it is not a very feasible option. It is useful in certain situations, like when it is applied to sectors like cement or iron and steel.



Conclusion

- But there are much **better options** available in other sectors. Replacement of **fossil fuels with renewables, afforestation** are much cheaper and more effective ways of dealing with emissions,”
- “There have also been at least two instances where the projects just did not work as designed,”.
- “CCS needs to be deployed in a **strategic and targeted manner**. This idea that because we have CCS, we can continue using fossil fuels for a longer time won’t work. We need to do sensible things like shifting to renewables and halting deforestation.”

