Environment & Ecology · GS - III

What is Carbon Capture, Utilization and Storage (CCUS)? What is the potential role of CCUS in tackling climate change?

EXAM YEAR	PAPER	SUBJECT
2025	GS - III	Environment & Ecology

MARKS	WORD LIMIT
10	~150 words

Answer Hint

CCUS, carbon capture, transport, utilization, geological storage, hard-to-abate sectors, decarbonisation, enhanced oil recovery, cost, leakage

Model Answer

Introduction

Carbon Capture, Utilization and Storage (CCUS) refers to capturing CO_2 emissions from industrial sources or the atmosphere, transporting the gas and either utilising it or permanently storing it in suitable geological formations.

1. Process

CO_2 can be captured from power plants and industrial facilities such as cement, steel and fertiliser units. It is then compressed and transported through pipelines or other means. Utilisation may involve fuels, chemicals, building materials or industrial applications, while storage involves deep geological formations.

2. Climate-change potential

CCUS can:

1. Decarbonise hard-to-abate sectors such as cement and steel.
2. Reduce emissions from existing industrial infrastructure.

3. Support low-carbon hydrogen production.
4. Enable negative-emission technologies when combined with sustainable biomass.
5. Help industries transition where direct electrification is difficult.

3. Limitations

High capital and energy costs, infrastructure requirements, uncertain economics, leakage risks and the possibility of prolonging fossil-fuel dependence remain concerns.

Conclusion

CCUS should complement—not substitute—renewable energy, energy efficiency and electrification. Its strategic value is greatest in sectors where deep decarbonisation through other technologies remains technically difficult.

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