NITI Ayog Releases CCUS Policy Framework

For Prelims: Carbon Capture, Utilization, and Storage (CCUS), CO_2 emissions, NITI Aayog, Carbon Taxes, IPCC, Cap-and-Trade systems.

For Mains: About Carbon Capture, **Utilization, and Storage (CCUS)**, Significance of CCUS Process, Challenges associated with CCUS, Way Forward.

Source: PIB

Why in News?

Recently, experts from research and academia highlighted the need for investment both from the government and industry in **Carbon Capture, Utilisation and Storage (CCUS)** and the importance of leading experts in the field to work collaboratively towards India's net zero targets through CCUS.

What is Carbon Capture, Utilization, and Storage (CCUS)?

- **About:** CCUS is a set of technologies and processes aimed at mitigating **carbon dioxide (CO_2) emissions** generated from large-scale point sources like power plants, industrial facilities, and refineries.
- **Objective:** The primary goal of CCUS is to prevent CO2 from being released into the atmosphere. It is considered a crucial strategy for the reduction of greenhouse gas emissions from industries.
- **Process:** The process involves three main steps:
    - **Capture:** This step involves capturing CO2 emissions at their source before they are released into the air.
        - There are various capture technologies, including post-combustion capture, pre-combustion capture, and oxy-fuel combustion.
    - **Transport:** This step involves moving compressed CO2 by ship or pipeline from the point of capture to the point of storage.
    - **Storage**: The transported CO2 is stored in underground geological formations which include depleted oil and gas fields or deep saline aquifers.
    - **Utilization:** Once captured, the CO2 can be utilized in various ways rather than being released. This may include using CO2 in industrial processes, such as manufacturing chemicals or fuels.

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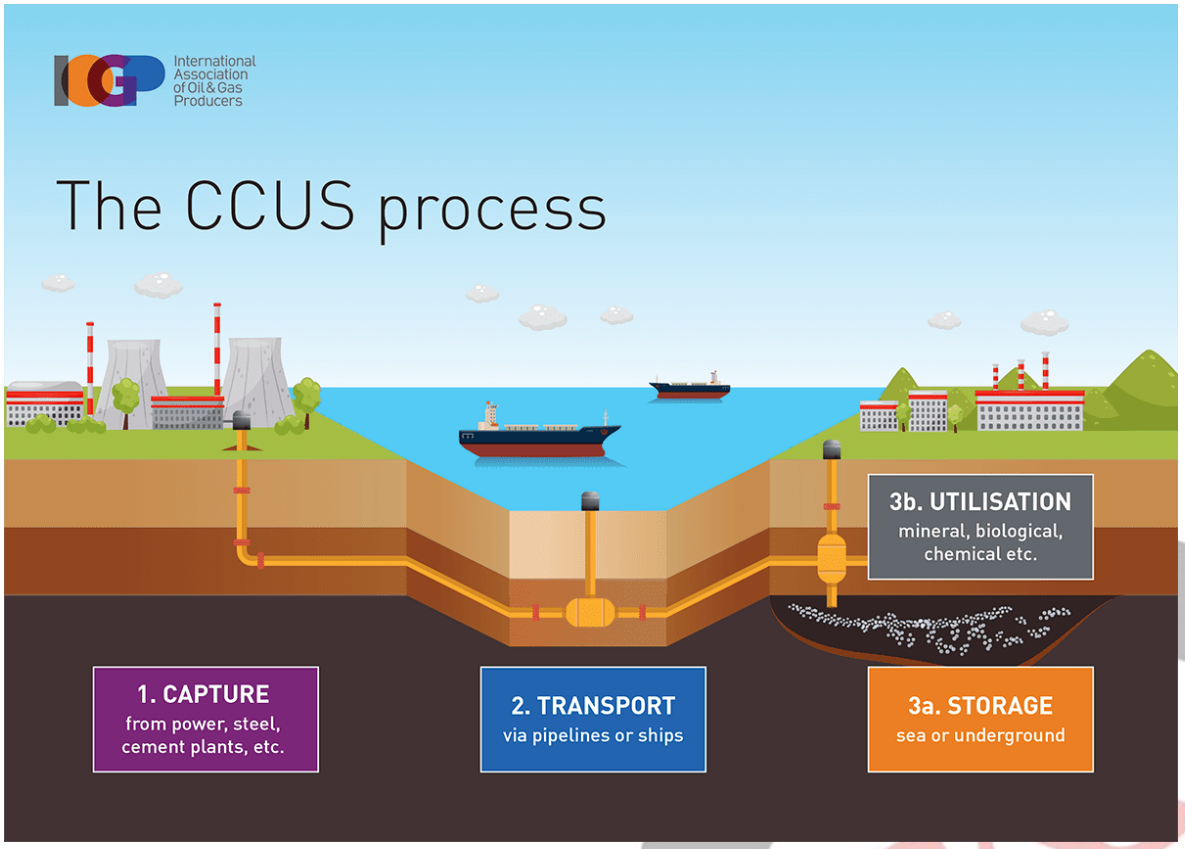

What is Significance of the CCUS?

- **Strategic Role in Decarbonization:**
  - In its report titled 'Policy Framework and Deployment Mechanism for Carbon Capture, Utilisation, and Storage in India,' **NITI Aayog** emphasizes the significance of CCUS as a strategy for reducing emissions. particularly in **hard-to-abate** sectors.
    - Hard-to-abate industries include categories like steel, cement, and petrochemicals.
  - The **IPCC** emphasizes that the deployment of CCUS technologies is crucial for achieving net zero emissions globally.
- **Energy Security:**
  - The incorporation of CCUS into the energy mix provides flexibility to the energy grid.
  - CCUS facilitates **low-carbon electricity and hydrogen production.** Hydrogen produced through CCUS serves as a direct substitute for fossil fuels.
  - This diversity enhances energy security, aligning with the growing priorities of governments worldwide.
- **Industrial Applications of CCUS**
  - **Concrete and Cement Industrial Sectors:** In the concrete and cement industry, CCUS technology captures CO_2 emitted during the firing of limestone and clay. The recovered CO_2 is then injected into concrete mixtures can enhance its strength and durability, a process known as carbonation.
  - **Basic Chemicals and Fuel Industrial Sectors:** CCUS serves as a source of CO_2 for synthetic gas production, which is essential for the further production of bio-jet fuel, aligning with sustainable aviation fuel initiatives.
  - **Fine Chemicals Sector:** The fine chemicals industry employs CCUS by capturing carbon dioxide (CO_2), blending it with biomass, and subsequently transforming it into oxygenated compounds like high-functional plastics.
- **Cost-Effective Solution:**
  - CCUS allows industries to continue using existing infrastructure, such as power plants and manufacturing facilities, reducing the need for significant capital investments in new, low-carbon alternatives.

What are the Challenges associated with CCUS?

- **High Initial Costs:**
  - Implementing CCUS on a large scale **necessitates significant infrastructure development,** including pipelines for transporting captured CO2 and suitable storage sites. This poses logistical challenges and requires substantial investments
- **Technological Maturity:**
  - CCUS technologies are in the initial phases of development and have not yet been widely deployed. Additionally, there are gaps in knowledge and experience when it comes to implementing and operating CCUS technologies.
- **Competition with Renewable Energy:**
  - CCUS competes for attention and resources with renewable energy technologies. Some argue that investments in renewables may offer a more direct and sustainable path to decarbonization
- **Absence of Regulatory Framework:**
  - The absence of clear and supportive regulatory frameworks can impede CCUS deployment. Ambiguities in regulations regarding liability, long-term responsibilities, and environmental standards may hinder investment.
  - The economic viability of CCUS projects depends on various factors, including the price of carbon, government incentives, and the availability of funding.

Way Forward:

- **Policy and Regulatory Support:** Governments should establish clear and supportive regulatory frameworks for CCUS projects. This includes addressing issues related to liability, long-term responsibilities, environmental standards, and permitting processes.
- **Financial Incentives:** Providing financial incentives, subsidies, and tax credits can encourage private-sector investment in CCUS projects. Implementing carbon pricing mechanisms, such as **carbon taxes or cap-and-trade systems**, can make CCUS more economically viable.
- **Infrastructure Development:** Governments and industries should invest in the necessary infrastructure for CCUS, including pipelines for CO2 transport and suitable storage sites.
- **Capacity Building:** Investing in education and training programs can address the knowledge and skill gaps in CCUS technology. Developing a **skilled workforce is essential** for the successful deployment and operation of CCUS projects.

UPSC Civil Services Examination, Previous Year Question (PYQ)

Q.Which one of the following statements best describes the term 'Social Cost of Carbon'? (2020)

(a) It is a measure, in monetary value, of the long-term damage done by a tonne of CO_2 emissions in a given year.

(b) requirement of fossil fuels for a country to provide goods and services to its citizens, based on the burning of those fuels.

(c) efforts put in by a climate refugee to adapt to livein a new place.

(d) contribution of an individual person to the carbon footprint on the planet Earth.

Ans: A

Mains

Q.Should the pursuit of carbon credits and clean development mechanisms set up under UNFCCC be maintained even though there has been a massive slide in the value of a carbon credit? Discuss with respect to India's energy needs for economic growth**.(2014)**