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MAINS IMPACT– 2025 – 12/11/2024

CARBON CREDIT MECHANISM

SYLLABUS:

GS 3 > Environment and Ecology >> Environment Conservation >>> Climate Change

REFERENCE NEWS:

The **Conference of Parties-29**, from November 11 to 22, 2024, in **Baku, Azerbaijan**, is about to shift focus to the heated discussion on the aspect of **climate finance** again. An essential component of this discussion will be the **carbon credits framework** and disagreements over it between developed and developing countries. India updated its **Nationally Determined Contributions (NDCs)** in 2023 to underline, among other things, the establishment of a **domestic carbon market** as a part of its climate strategy.

CARBON CREDIT MECHANISM:

- The Carbon Credit Mechanism is a **market-based approach** designed to reduce greenhouse gas (GHG) emissions by assigning economic value to carbon reductions.
- Under this system, organizations or countries earn "**carbon credits**" when they reduce or avoid emissions, and these credits can be traded or sold to others that need to offset their own emissions. Each carbon credit typically represents a reduction of one metric ton of CO₂ or its equivalent in other greenhouse gases.
- **Article 6 of the Paris Agreement** sets out how countries can pursue voluntary cooperation to reach their climate targets. It enables international cooperation to tackle climate change and unlock financial support for developing countries.
- Under Article 6, countries are able to transfer carbon credits earned from the reduction of greenhouse gas emissions to help one or more countries meet their climate targets. There are three tools which countries can draw upon under Article 6, one of which is the **Paris Agreement Crediting Mechanism (PACM) - the UN's new high-integrity carbon crediting mechanism.**
- Carbon credits are generated by projects that either reduce or prevent carbon emissions, such as renewable energy projects, afforestation, or methane capture. These credits become **tradeable assets** in carbon markets.
- **Compliance vs. Voluntary Markets:** Carbon credits are traded in two main types of markets:
 - **Compliance Markets:** This is a regulated market where entities are mandated to meet specific emission targets. India is moving toward establishing a

compliance market, mainly driven by the **Perform, Achieve, and Trade (PAT)** scheme initiated by the Bureau of Energy Efficiency (BEE).

- **Voluntary Markets:** The voluntary carbon market allows companies or individuals to buy carbon credits to offset their emissions on a voluntary basis. Companies and organizations, especially those with CSR mandates or sustainability goals, participate in this market to demonstrate climate leadership.
- **Carbon Offsetting and Net Zero:** Carbon offsetting is a method used by individuals, companies, and governments to compensate for their greenhouse gas emissions by funding an equivalent amount of carbon savings elsewhere. This often involves investing in projects that reduce emissions, such as renewable energy, forest conservation, or reforestation initiatives. Entities can achieve “net zero” by balancing emissions with equivalent reductions or removals, often achieved by purchasing carbon credits to offset unavoidable emissions.

INDIA’S CARBON CREDIT MECHANISM:

- **The Clean Development Mechanism (CDM):** The CDM, established under the Kyoto Protocol, allowed developed countries to invest in emission-reducing projects in developing nations to earn carbon credits (Certified Emission Reductions or CERs).
 - India has been one of the largest beneficiaries of CDM, with over 1,600 registered projects (approximately 30% of global CDM projects) as of 2022, contributing to around 246 million CERs generated.
- **Perform, Achieve, and Trade (PAT) Scheme:** The PAT scheme **targets energy-intensive industries**. The scheme sets energy efficiency improvement targets, and companies that surpass their targets receive **Energy Saving Certificates (ESCerts)**, which they can sell to other entities within the same sector that fail to meet their targets.
 - In the cement industry, ACC Limited, one of India’s largest cement companies, met its energy savings targets, enabling it to generate ESCerts. These certificates are then tradable on platforms like the Indian Energy Exchange (IEX).
- **Renewable Energy Certificates (RECs):** The REC mechanism was introduced to help entities meet their **Renewable Purchase Obligations (RPOs)** without setting up their own renewable energy sources. RECs represent one megawatt-hour (MWh) of electricity generated from renewable sources.

- The REC market in India has grown significantly, with over 88 million RECs traded as of 2023. By purchasing RECs, entities support renewable energy projects while meeting compliance.
- **Carbon Credit Trading Platform:** In 2023, India introduced the **Carbon Market Bill** as part of its strategy to establish a national carbon credit trading platform. This platform is expected to consolidate mechanisms like PAT and RECs and broaden carbon trading across more sectors. Building on the Electricity Conservation Act, 2001, and the Environment (Protection) Act, 1986, India launched the CCTS to reduce GHG emissions by trading carbon credit certificates. The compliance segment of CCTS will commence in 2025-26, allowing non-obligated entities to participate and trade carbon credit certificates (CCCs).
- **Net Zero Pledge:** India aims to reach net zero emissions by 2070. The carbon credit mechanism is a key tool for achieving this target, providing incentives for low-carbon projects across sectors.
- India has been among the top three countries supplying CERs worldwide, alongside China and Brazil.
- **Carbon Credit Generating Projects in India**
 - The ReNew Power Wind Project in Gujarat is registered under international carbon standards, generating carbon credits that are sold globally.
 - **Methane Capture Projects:** The Sardar Patel Renewable Energy Research Institute's (SPRERI) biogas plant captures methane emissions from organic waste and converts them into energy, reducing both CO₂ and methane emissions.
 - **Industrial Emission Reduction Projects:** Tata Steel has implemented a CDM project that reduces nitrous oxide emissions from its manufacturing processes.

BENEFITS OF CARBON CREDIT MECHANISM:

- **Promotes Clean Energy and Reduces Fossil Fuel Dependence:** Carbon trading mechanisms encourage companies to invest in renewable energy, as credits earned from renewable projects can be traded for profit. This reduces reliance on fossil fuels and supports India's renewable energy targets.
 - As of 2023, India's renewable energy capacity exceeded 170 GW (mainly from wind and solar), significantly supported by carbon credit revenue streams that make renewable projects more economically viable.

- **Encourages Energy Efficiency in Industries:** Under the Perform, Achieve, and Trade (PAT) scheme, industrial units receive Energy Savings Certificates (ESCs) for surpassing their energy efficiency targets. These certificates can be traded, incentivizing other companies to meet their efficiency targets.
 - By the end of the PAT scheme's first cycle, it had saved around 14 million tons of CO₂ equivalent emissions, demonstrating the scheme's effectiveness in improving industrial energy efficiency across sectors like steel, aluminum, and textiles.
- **Generates Revenue and Attracts Foreign Investment:** Carbon credits provide an additional revenue stream for projects that reduce emissions, particularly in sectors like renewable energy, forestry, and waste management and also attracts foreign investment.
 - Indian renewable energy projects, such as those by companies like Greenko and Suzlon, have generated millions of carbon credits, attracting international buyers. India has been one of the largest suppliers of carbon credits globally, contributing over 246 million CERs through Clean Development Mechanism (CDM) projects by 2022, and attracting investment from entities seeking affordable offsets.
- **Supports Climate Goals:** Carbon trading helps India achieve its commitments under the Paris Agreement, including reducing the carbon intensity of its GDP by 45% by 2030. The revenue from carbon credits supports projects that directly contribute to these goals.
 - Waste-to-energy projects in India, such as the Okhla Waste-to-Energy Plant in Delhi, capture methane (a potent GHG) from waste and convert it into electricity. This project not only reduces landfill emissions but also generates carbon credits, which can be sold to help fund operations.
- **Drives Rural Development and Job Creation:** Carbon credit projects often focus on rural or underdeveloped areas, creating employment and fostering economic development. Projects like afforestation, renewable energy, and bio-digester plants provide local jobs, improve infrastructure, and encourage sustainable practices.
 - The Bagepalli CDM Reforestation Project in Karnataka involved reforesting degraded lands, sequestering CO₂, and earning carbon credits. The project created local jobs in planting, monitoring, and maintaining forests while also providing an additional revenue stream to the local communities through the sale of carbon credits.
- **Incentivizes Sustainable Waste Management:** Carbon trading encourages sustainable waste management practices by enabling projects that capture methane emissions or convert waste to energy to earn carbon credits, which can then be sold.

- The Pune Waste-to-Energy Project converts organic waste into electricity and generates carbon credits, reducing both methane emissions and the city's dependence on fossil fuels. According to studies, proper waste management could reduce 15-20% of methane emissions in India, which is a highly potent GHG.
- **Prepares India for Participation in Global Carbon Markets:** By developing a structured carbon trading system, India can position itself as a key player in international carbon markets. This could lead to future linkages with other national and regional carbon markets, creating further opportunities for economic growth and sustainability.
 - India's new Carbon Market Bill 2023 lays the foundation for a national compliance carbon market that can potentially link with international markets, allowing for greater market liquidity and trading opportunities.

CHALLENGES OF CARBON CREDIT MECHANISM:

- **Volatile Carbon Credit Prices:** Carbon credit prices can fluctuate significantly based on market demand, supply, and regulatory changes. This volatility makes it difficult for project developers to predict revenues, which may discourage long-term investments.
 - Under the Clean Development Mechanism (CDM), the prices of Certified Emission Reductions (CERs) dropped sharply in the 2010s, from over \$20 per ton to as low as \$0.40 in some cases. This decline reduced the profitability of Indian projects registered under CDM, leaving many projects underfunded or abandoned.
- **Regulatory Uncertainty and Fragmented Market Framework:** India's carbon market is fragmented, with several overlapping mechanisms like the Perform, Achieve, and Trade (PAT) scheme and Renewable Energy Certificates (RECs). Additionally, India's proposed national carbon market under the Carbon Market Bill 2023 is still under development, leading to uncertainty about how existing systems will integrate.
 - As of 2024, India is developing a unified carbon market platform, but uncertainties around implementation and integration remain. This disjointed structure limits private-sector participation and complicates the regulatory landscape.
- **Lack of Demand for Indian Carbon Credits in International Markets:** The demand for Indian carbon credits, especially under the CDM, has decreased due to regulatory shifts and the availability of cheaper credits from other countries. India has faced challenges in ensuring international acceptance of its credits under the Paris Agreement's Article 6.

- By 2022, over 200 million unsold CERs from Indian projects remained unused due to lack of demand and low prices, which greatly impacted Indian CDM projects and led to project delays or terminations.
- **Verification and Monitoring Challenges:** Carbon credit projects require rigorous monitoring, reporting, and verification (MRV) to ensure that emissions reductions are real, measurable, and additional.
 - According to India's Ministry of Environment, Forest, and Climate Change, small-scale projects in rural areas, such as biogas and micro-hydro, struggle with MRV due to limited access to skilled personnel and monitoring technology, raising concerns over the credibility of carbon reductions claimed.
- **High Project Development and Transaction Costs:** Developing a carbon credit project can be costly, especially in terms of setting up, certification, monitoring, and reporting. These costs reduce the net profit for project developers, especially for small-scale projects or those in remote regions.
 - The World Bank estimated that MRV costs could amount to over 30% of the carbon credit revenue for small projects, deterring small and medium enterprises (SMEs) from entering the carbon credit market due to reduced profitability.
- **Limited Awareness and Capacity in Domestic Sectors:** Many industries and organizations in India, especially smaller ones, lack awareness of carbon credit mechanisms and how they could benefit from participating. This limits the pool of projects and sectors that could contribute to emissions reductions.
 - According to the Bureau of Energy Efficiency, only about 10% of eligible industries in sectors like textiles and leather actively participate in carbon trading programs due to limited understanding of the process and benefits.

WAY FORWARD:

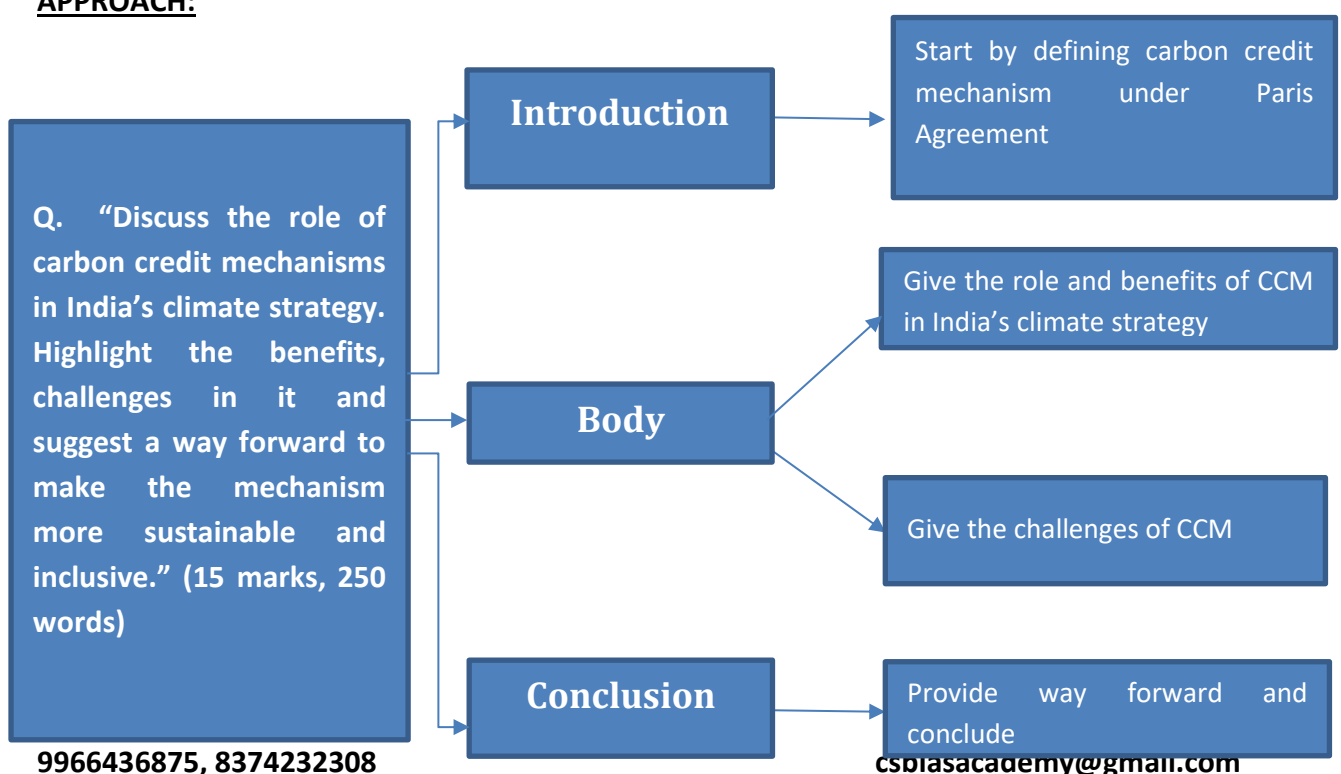
- **Develop a Unified and Transparent Regulatory Framework:** The EU's Emissions Trading System (ETS) offers clear guidelines, predictable rules, and strong oversight, which enhance market stability and investor confidence. India could create similar regulatory structures for consistency and trust.
- **Introduce a Price Floor for Carbon Credits to Stabilize Revenue:** The UK Carbon Price Support mechanism prevents the carbon price from falling below a certain level, which has encouraged steady investment in emission reduction projects.
- **Enhance Monitoring, Reporting, and Verification (MRV) Systems:** Japan's Joint Crediting Mechanism (JCM) uses blockchain technology to provide accurate, verifiable records, increasing the reliability and credibility of emission reduction claims.
- **Promote Inclusion of Diverse Sectors, Including Agriculture and Small-Scale Projects:** Colombia's Amazon Forest Conservation Project earns carbon credits by engaging rural communities and indigenous groups in forest protection, creating income opportunities while reducing deforestation.

- **Set Up a Carbon Credit Clearing House to Reduce Transaction Costs:** California's cap-and-trade program includes a clearinghouse, making it easier for local businesses to trade credits efficiently and reducing transaction costs for small and medium-sized entities.
- **Encourage International Participation through Article 6 of the Paris Agreement:** Switzerland and Peru signed a bilateral agreement under Article 6 to exchange carbon credits, creating a framework for countries to benefit mutually from carbon reduction efforts.
- **Introduce Mechanisms to Avoid Double Counting:** The EU ETS requires clear reporting protocols to avoid double counting, which has been effective in ensuring transparency and compliance with international standards.
- **Educate and Raise Awareness Among Stakeholders:** Canada's federal government funds training and educational programs on carbon markets to ensure small businesses and local industries are equipped to participate.
- **Create Incentives for Sustainable Development Co-Benefits:** Costa Rica's carbon credits prioritize projects that also protect biodiversity and improve local livelihoods, which increases their appeal to both national and international buyers.
- **Build Market Confidence with Robust Third-Party Verification:** Projects certified by the Gold Standard are more valuable on the market due to rigorous verification, attracting higher prices and providing assurance to buyers.

PRACTICE QUESTION:

Q. "Discuss the role of carbon credit mechanisms in India's climate strategy. Highlight the benefits, challenges in it and suggest a way forward to make the mechanism more sustainable and inclusive." (15 marks, 250 words)

APPROACH:



MODEL ANSWER:

The carbon credit mechanism is a market-driven approach to reduce greenhouse gas (GHG) emissions by assigning economic value to carbon reductions. India, as a significant emitter and a developing economy, has adopted carbon credit mechanisms as part of its climate strategy to meet its Nationally Determined Contributions (NDCs) and to achieve net-zero emissions by 2070. This system not only helps in reducing emissions but also contributes to sustainable development and international cooperation under the Paris Agreement's Article 6 framework.

ROLE AND BENEFITS OF THE CARBON CREDIT MECHANISM IN INDIA:

- **Promotes Clean Energy and Reduces Fossil Fuel Dependence:** Carbon credits incentivize renewable energy projects, such as solar and wind. For instance, the ReNew Power wind project in Gujarat generates carbon credits that are traded internationally, supporting India's renewable capacity of over 170 GW as of 2023
- **Encourages Industrial Energy Efficiency:** Under the Perform, Achieve, and Trade (PAT) scheme, industries receive Energy Savings Certificates (ESCerts) for exceeding energy efficiency targets. By 2020, this scheme had saved approximately 14 million tons of CO₂, showcasing its effectiveness in sectors like steel and cement
- **Generates Revenue and Attracts Foreign Investment:** India is a major supplier of carbon credits through the Clean Development Mechanism (CDM), generating over 246 million Certified Emission Reductions (CERs) as of 2022. This has attracted international investments, with companies like Suzlon and Greenko selling millions of credits globally
- **Supports Sustainable Waste Management:** Carbon credits encourage waste-to-energy projects, such as the Okhla plant in Delhi, which captures methane from waste and reduces fossil fuel use. Methane capture could potentially reduce 15-20% of methane emissions in India, a highly potent GHG

CHALLENGES FACING INDIA'S CARBON CREDIT MECHANISM:

- **Volatile Prices:** Carbon credit prices fluctuate, making revenue prediction difficult and discouraging investment. For example, CER prices fell from over \$20 to below \$0.40 per ton during the 2010s, impacting Indian CDM projects
- **Regulatory Uncertainty and Fragmented Framework:** India's market is fragmented, with multiple overlapping schemes (PAT, REC), creating confusion for investors. Uncertainty about integrating these into a cohesive national system further complicates participation

- **Verification and Monitoring Issues:** Ensuring transparency and accuracy in emissions reporting is challenging, especially for small-scale rural projects that lack advanced monitoring resources
- **High Transaction Costs:** The costs of project certification, monitoring, and reporting are high, especially for small projects, reducing profitability and discouraging smaller enterprises from participating
- **Limited International Demand:** Regulatory shifts and cheaper credits from other countries have reduced demand for Indian credits, with over 200 million CERs from Indian projects remaining unsold

WAY FORWARD:

- **Develop a Unified Regulatory Framework:** A centralized authority for carbon trading can streamline the existing mechanisms under a single platform, similar to the EU's Emissions Trading System (ETS). This would simplify compliance and enhance investor confidence
- **Introduce a Price Floor:** Setting a minimum price for carbon credits, as seen in the UK, could stabilize revenue and make projects more financially viable for long-term investment
- **Enhance MRV Systems:** Implement digital tools like blockchain for real-time monitoring, which would increase transparency, particularly for rural projects. Japan's use of blockchain in carbon monitoring serves as a strong model
- **Promote Inclusion Across Sectors:** Expanding carbon credit opportunities to agriculture and waste management can increase participation. For example, Colombia's Amazon Forest Conservation Project involves local communities, creating income while reducing deforestation
- **Encourage International Participation and Avoid Double Counting:** Partnering under Article 6 and implementing strict double-counting safeguards would make Indian credits more attractive internationally

The carbon credit mechanism offers India a powerful tool to combat climate change while promoting sustainable economic development. However, achieving an inclusive, stable, and effective carbon market requires policy integration, price stability, and international alignment. By addressing these challenges, India can position itself as a global leader in carbon credit trading, balancing growth with environmental responsibility.