The Scope of Carbon Credit Trading Policies for India's burgeoning construction sector in par with International market

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Abstract:

India, a rapidly developing nation, plays a crucial role in the global response to climate change. While being one of the largest greenhouse gas emitters, its relatively low per capita emissions present a unique challenge in formulating effective climate strategies. In recent years, India has initiated steps to develop a carbon trading framework aimed at incentivizing emission reductions and promoting sustainable development. This paper aims to examine the current policy landscape in India related to carbon emission mitigation in the construction sector. The Paper also explore the potential for integrating carbon credit trading within existing frameworks to support a low-carbon transition in the built environment.

The analysis highlights the significance of harmonizing economic growth with environmental responsibility, offering insights into how integrated carbon reduction policies can benefit stakeholders, including governments, industry players, and the broader community.

Keywords:

Carbon trading, Carbon credit, Climate policy, Emissions trading, Construction sector, Indian Policy, frameworks, International Carbon market

1. Introduction

The concept of carbon trading has emerged as a market-based mechanism to mitigate greenhouse gas emissions and combat climate change (Sarkar & Dash, 2011). Carbon trading, at its core, involves the buying and selling of emission allowances or credits, creating a financial incentive for entities to reduce their carbon footprint (Yu & Zhennan, 2011). Carbon trading operates on the principle of assigning a price to carbon emissions, thus internalizing the environmental costs associated with emitting greenhouse gases (Yu & Zhennan, 2011).

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This mechanism encourages entities to seek cost-effective ways to reduce emissions, as they can either invest in emission-reduction technologies or purchase carbon credits from entities that have reduced emissions beyond their allocated limits (Yu & Zhennan, 2011). This approach aligns with the polluter pays principle, where those responsible for emissions bear the financial burden of their environmental impact (Yu & Zhennan, 2011). Effective carbon trading necessitates the establishment of a carbon price that accurately reflects the scarcity of emission rights and the societal desire for a healthy environment (Yu & Zhennan, 2011).

The building sector has a decisive role to play in mitigating climate change, as it accounts for approximately 36% of global final energy use and 39% of energy-related carbon dioxide emissions (Sosa & Fadai, 2019). Globally, the building sector consumes nearly one-third of global energy consumption and is responsible for about one-third of total direct and indirect energy-related carbon dioxide emissions (Loosemore & Perry, 2019). The construction sector's carbon footprint arises from various sources, including the production of building materials, construction processes, and building energy consumption (Huang et al., 2017).

Direct carbon emissions stem from on-site construction operations, such as construction, maintenance, or demolition activities, while indirect carbon emissions result from the supply of construction operations with both products and services, including upstream operations like the manufacture of bricks (Zainordin & Zahra, 2020).

Carbon trading aims to create a market-based mechanism to reduce greenhouse gas emissions by assigning a price to carbon. The main goal is to combat climate change and reduce Greenhouse Gas emissions in a cost-effective way (Nguyen et al., 2021).

The Kyoto Protocol, an international agreement adopted in 1997, played a pivotal role in popularizing the concept of carbon trading (Bhowmik, 2016). The protocol committed industrialized countries to reduce their greenhouse gas emissions between 2008 and 2012 to levels 5.2% lower than those of 1990 (Bhowmik, 2016). Carbon trading essentially trades the right to emit greenhouse gases. Through the effect of carbon trading market, it is important to construct the price of carbon, which reflects the scarcity

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of the right to emit greenhouse gases and the want of the well earth environment in essence (Bhowmik, 2016; Yu & Zhennan, 2011).

1.1 Carbon Credit Trading: An Overview

Carbon credit trading is a market-based mechanism designed to reduce greenhouse gas (GHG) emissions by allowing entities to buy and sell credits that represent the right to emit a specific amount of carbon dioxide or its equivalent (UNFCCC, 2021; World Bank, 2022). Each credit typically equals one metric ton of CO_2, and the system incentivizes emission reductions by placing a monetary value on carbon emissions. It is also known as cap-and-trade systems, have been implemented in various countries and regions around the world as a means to reduce greenhouse gas emissions. The system sets a cap on the total amount of emissions allowed from regulated entities, and these entities are then allocated emission allowances or credits, representing the right to emit a certain amount of greenhouse gases. Entities that reduce their emissions below their allocated limits can sell their surplus allowances to entities that exceed their limits, creating a market for carbon emissions. It has impacted economic development and environmental protection, involving various stakeholders, including regional governments (Zhang et al., 2017).

1.2 Carbon Credit financing:

Carbon credits can be purchased by companies to offset their carbon footprint, providing additional revenue streams for these projects (Saraji & Borowczak, 2021). A carbon credit represents one ton of CO_2 equivalent that is reduced, removed, or avoided from the atmosphere through a verified project. Organizations that exceed their emission limits can acquire these credits from projects that actively remove or prevent greenhouse gas emissions, such as reforestation, renewable energy, or carbon capture initiatives. By purchasing these credits, organizations indirectly finance global green infrastructure and environmental projects.

2. Methodology:

This study will adopt a multi-method qualitative research methodology. The structure of study starts with investigating the Literature review of international reports (IPCC, UNFCCC, World Bank), National policies and legal frameworks and National and International existing carbon trading schemes to understand global and national approaches to carbon trading and mitigation in the construction sector. Conduct a Policy analysis to critically assess Indian policies to understand coverage of carbon stages (upfront, operational, end-of-life, whole life). The mixed-methods approach was chosen to capture both quantitative data on engagement scores and qualitative insights from the reports and data collected. Map the gaps in current implementation vis-à-vis international best practices and identify challenges in order to evaluate India's readiness to adopt the robust carbon credit trading within construction policy frameworks. Finally concluding the opportunities and recommendations for establishing a robust carbon market in India.

3. Major Carbon Trading Models Worldwide:

3.1 Compliance Carbon Markets (CCMs):

CCM are carbon credit markets where an economic actor utilizes carbon credits to spend towards legally mandated emission cuts. These markets are run by the government or international bodies along with treaties countries utilize in which

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organizations demand reduced emission levels. Some of the leading markets include:

- **EU ETS:** An Emission Trading System put forth by the European Union in 2005. EU ETS is integrated within the electricity, industrial, and airline sectors across the European Union, Iceland, Liechtenstein and Norway. Has contributed to a reduction in EU emissions in electricity and industry of more than 40% since 2005. The EU-ETS works on a Cap-and-Trade principle which allows companies that generate point source emissions to receive or buy emission allowances, which can be traded as needed.
- **China's National ETS**: The world's largest carbon market, covering about 4.5 billion tonnes of CO2 emissions. It was launched in 2021, and is the world's largest carbon market. Initially covers the power sector but is expected to expand to other industries (Yu & Zhennan, 2011). The market stimulates investments in low-carbon technologies and helps China achieve its climate goals.
- California's Cap-and-Trade Program: California's cap-and-trade program has helped to reduce emissions in the state by about 10% since 2013. Integrated carbon trading/carbon tax policies are more effective in reducing carbon emissions (Zhang et al., 2017). The EU's experience provides lessons for other countries considering carbon trading schemes.
- **RGGI (Regional Greenhouse Gas Initiative) in the U.S.:** The Regional Greenhouse Gas Initiative is a cooperative effort among the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Vermont, and Virginia to cap and reduce CO2 emissions from the power sector. RGGI is the first mandatory cap-and-trade program in the U.S. to reduce greenhouse gas emissions.

3.2 Voluntary Carbon Markets:

Voluntary carbon markets allow individuals, companies, and organizations to voluntarily offset their emissions by purchasing carbon credits from projects that reduce or remove greenhouse gases from the atmosphere. These projects can include renewable energy, forestry, and energy efficiency initiatives (Carbon Offsets: The U.S. Voluntary Market Is Growing, but Quality Assurance Poses Challenges for Market Participants, 2008). While voluntary markets do not carry the force of law, they play an important role in driving investment in climate solutions and raising awareness about carbon emissions.

- **Verra's Verified Carbon Standard (VCS)** – The largest voluntary carbon credit registry. As of 2021, Verra reported registering 1,687 projects under the VCS, collectively reducing 582 million tonnes of greenhouse gases (The amount of carbon sequestered by 1.35 billion tree seedlings grown for 10 years).
- **Gold Standard –** Ensures social and environmental co-benefits. It is known for its high environmental integrity and social impact standards.
- **American Carbon Registry (ACR) –** Recognized for its rigorous methodology, particularly in North America.
- **Climate Action Reserve –** Focuses on North American projects with a rigorous set of standards (Howell, 2020).

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Trading schemes		Credits type	Geographic scope	launch year	Cap ($MtCO_2e$) in 2021
Compliance Carbon Markets					
European Union Emissions Trading System		Allowances	European Union	2005	1,570
California Cap-and-Trade Program		Allowances	California and Quebec	2013	320
Regional Greenhouse Gas Initiative		Allowances	Northeastern United States	2009	68
New Zealand Emissions Trading Scheme		Allowances	New Zealand	2008	32
China National Emissions Trading Scheme		Allowances	China	2021	4,500
Clean Development Mechanism		Credits	Worldwide	2006	< 10
Joint Implementation		Credits	Worldwide	2006	< 10 (Limited activity)
Voluntary Carbon Markets					
Verified Carbon Standard (VCS) (63% of market share)		Credits	Worldwide	2006	300
Gold Standard (20 % of market share)		Credits	Worldwide	2003	(data shared is limited)
American Carbon Registry (ACR)	(4%of market share)	Credits	Worldwide	1996	< 10
Climate Action Reserve		Credits	North America	2008	(data shared is limited)

Table:1: Summary of Major global Carbon Trading schemes
Source: Author

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3.3 India's Carbon Credit Trading Scheme (CCTS): CCTS is a robust National Framework for an Indian Carbon Market is being developed by BEE (Bureau of Energy Efficiency) to help the country meet its ambitious climate goals. This framework seeks to aid entities by monetizing their further efforts towards the reduction of greenhouse gases emissions by means of a compliance mechanism covering emissions from energy use and industry and an offset mechanism rewarding voluntary GHG reduction actions. This strategic framework seeks to achieve a net zero emission economy in India. In order to fulfill these goals, appropriate provisions were made in the Energy Conservation (Amendment) Act, 2022. It allows Central Government to "Specify Carbon Trading Scheme". The Trading schemes from Table :1 applies worldwide are applicable in India also. Under the PAT scheme, Indian units have been able to save more than 106 million tonnes of CO2 emissions since 2015 till June 2024.

4. Types of Carbon Credits:

4.1 Blue Carbon Credits: Blue carbon credits are generated from coastal and marine ecosystems, such as mangroves, seagrass meadows, and salt marshes. These ecosystems have the ability to sequester and store significant amounts of atmospheric carbon dioxide. Projects aimed at restoring and conserving these carbon sinks are supported by standards like the Verra Blue Carbon Initiative. Example: Indonesia's Blue Carbon Project supporting mangrove restoration (Alongi, 2014, 2018; Himes-Cornell et al., 2018). Countries with extensive coastlines (e.g., Indonesia, Australia, and the UAE) actively invest in blue carbon projects.

4.2 Green Carbon Credits: Green carbon credits are associated with land-based natural ecosystems such as forests, grasslands, and regenerative agriculture. They are generated from projects focused on reforestation, afforestation, and soil carbon sequestration. These credits are frequently traded in Voluntary Carbon Markets, with standards like the Gold Standard and Verified Carbon Standard being commonly utilized. An illustrative example is the REDD+ projects in the Amazon rainforest (Anderson, 2016; Gautam et al., 2021). Countries with high forest coverage (e.g., Brazil, Canada, and India) invest heavily in green carbon initiatives.

4.3 Black Carbon Credits: If the initiatives rely on thermal processing (such as pyrolysis of plastic to convert it into energy or fuel), black carbon credits usually stem from initiatives aimed at curtailing soot emissions from activities such as burning biomass or utilizing outdated diesel engines. Countries like China, the US, and India are introducing strict policies to reduce black carbon emissions (e.g., switching to cleaner cookstoves, banning outdated diesel engines).

4.4 Gold Carbon Credits: Gold carbon credits are considered high-quality offsets that provide additional social and environmental benefits beyond just carbon reduction. These credits are often certified under premium standards like the Gold Standard and Climate, Community & Biodiversity Standards, which ensure they support initiatives focused on biodiversity conservation, water security improvements, and

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community development. It is popular in Africa, Asia, and Latin America, especially in community-based projects like improved cookstoves and clean water access. An illustrative example is the cookstove projects in Africa, which not only reduce deforestation but also enhance public health outcomes (Martín et al., 2020; Onah et al., 2021; Yenita & Soegiarso, 2024).

5. **Policy frameworks for handling carbon emissions in construction sector in India:** The Policy frameworks which addresses Carbon emissions are discussed below.

5.1 **Energy and Sustainability Policies:** Energy Conservation Building Code (ECBC), Green Rating for Integrated Habitat Assessment (GRIHA), Indian Green Building Council (IGBC), Leadership in Energy and Environmental Design (LEED) India, and the Bureau of Energy Efficiency (BEE) Star Rating System.

5.2 **Environmental & Climate Policies:** Environmental Impact Assessment (EIA) Notification – 2006 which mandates assessment of air, water, soil, biodiversity, and energy use. Construction & Demolition (C&D) ,Waste Management Rules – 2016 issued by the Ministry of Environment, Forest, and Climate Change (MoEFCC) which promotes reuse and recycling of construction waste. National Action Plan on Climate Change (NAPCC) – 2008, focuses on energy efficiency in buildings, urban planning, and waste management.

5.3 **Safety & Regulatory Policies-** National Building Code (NBC) – 2016 encourages use of low-carbon materials reducing the embodied carbon footprint and promotes Green infrastructures lowering operational carbon emissions.

5.4 **Urban Planning & Smart City Policies:** Smart Cities Mission – 2015- focuses on green buildings, energy efficiency, smart mobility, and digital governance, Pradhan Mantri Awas Yojana (PMAY) – 2015 encourages on affordable housing for all.

5.5 **Infrastructure & Material Efficiency Policies**: Fly Ash Utilization Policy – 1999 (Updated 2016, 2021), mandates use of fly ash in bricks, cement, and construction to reduce environmental impact. Steel and Cement Industry Decarbonization Policies encourages the use of low-carbon materials and promotes recycled steel, green cement, and alternative materials in construction.

6. Challenges and Opportunities

India has high potential for earning carbon credits because it is a developing country with low costs for emission reductions (Siriwardana & Nong, 2021).

The most important challenge is the precise calculation and verification of emission reduction. There is a risk that credits will be issued for emissions reductions that have not occurred unless there are *effective monitoring, reporting, and verification systems in place.* Credibility of carbon credits can be improved through the adoption of verified carbon standard protocols and independent third-party verification by credible institutions. Lack of expertise regarding the various types of emissions and carbon credits poses additional challenges. For instance, multiple departments of oceanology and river resources should develop expertise for evaluating *Blue Carbon Credits (mentioned in 3.1 and is globally accepted)* instead of the Bureau of Energy Efficiency alone.

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Sr. no	Policy frameworks	Targeted Emissions	Construction strategy	Impact
1	**Energy and Sustainability Policies**			
1.1	Energy Conservation Building Code (ECBC)	Operational carbon	Mandates energy-efficient building design and construction.	40% less energy savings in commercial buildings, contributing to reduced grid reliance and lower carbon footprint.
1.2	Green Rating for Integrated Habitat Assessment (GRIHA)	Whole-Life Carbon		40% less energy savings in buildings, decreased reliance on fossil fuels, reduced greenhouse gas emissions, and promotion of clean energy technologies, contributing to reduced grid reliance and lower carbon footprint. Decreased waste sent to landfills, reduced methane emissions, and promotion of circular economy principles.
		Embodied carbon	Materials with low embodied energy and the adoption of construction strategies	
		Sequestered Carbon	On-site energy production, facility energy use, travel, and waste generation.	
		Upfront Carbon	Encourages the use of renewable energy systems such as solar photovoltaic, solar thermal, and wind energy for on-site power generation and heating.	
		Operational carbon	Promotes Active and Passive energy -water-efficient landscaping practices, rainwater harvesting, and greywater recycling to minimize water consumption and associated energy use.	
		Avoided Carbon	Waste segregation, composting, and recycling to minimize waste generation and promote resource recovery, reducing landfill emissions.	
1.3	Indian Green Building Council (IGBC) & LEED India	Not fully access whole-Life Carbon		Provisions for End-of-Life Consideration in IGBC and LCA in LEED India- points
		Embodied carbon	Utilizes eco-friendly building materials with low embodied carbon, recycled content, and regional sourcing to minimize environmental impact.	Reduced carbon footprint of building materials, support for local manufacturing, and promotion of sustainable supply chains
		Sequestered Carbon	Promotes the adoption of smart building technologies, automation, and energy-efficient appliances to optimize building performance and reduce energy consumption.	Enhanced energy efficiency, reduced operational costs, and improved building management through data-driven insights.

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		Upfront Carbon	Encourages the integration of passive design strategies such as natural lighting, ventilation, and shading to minimize the need for artificial lighting and mechanical cooling.	Reduced energy consumption, improved thermal comfort, and enhanced visual comfort for building occupants.
		Operational carbon	Focuses on optimizing indoor air quality through ventilation, filtration, and the use of low-VOC materials to enhance occupant health and well-being.	Improved indoor environmental quality, reduced health risks, and enhanced productivity of building occupants.
		Avoided Carbon	Promotes the implementation of water-efficient plumbing fixtures, rainwater harvesting systems, and greywater treatment technologies to reduce water consumption and wastewater generation.	Reduced water demand, lower water bills, and enhanced water conservation in buildings.
		Biogenic carbon	Focuses on responsible sourcing of timber and wood products from sustainably managed forests, ensuring carbon sequestration and biodiversity conservation.	Promotion of sustainable forestry practices, preservation of carbon sinks, and biodiversity conservation in forestry operations.
1.4	Bureau of Energy Efficiency (BEE) Star Labelling Program	Operational carbon	Promotes the implementation of building commissioning processes to ensure that building systems are designed, installed, and operated according to performance requirements.	Highest energy savings 50% for appliances. Reduced electricity demand, lower energy costs, and improved lighting quality in buildings.
2	**Environmental & Climate Policies**			
2.1	Environmental & Climate Policies: Environmental Impact Assessment (EIA) Notification – 2006	Upfront Carbon	Promotes the use of cleaner fuels and technologies in industrial processes to reduce air pollution and greenhouse gas emissions from the industrial sector.	Reduced air pollution, decreased greenhouse gas emissions
		Operational carbon	Mandates environmental impact assessments for various development projects to evaluate and mitigate potential environmental impacts, including greenhouse gas emissions.	28% of carbon emissions in operational phase

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		End-of-Life Carbon	Focuses on the conservation of natural resources through afforestation, reforestation, and the protection of ecologically sensitive areas, enhancing carbon sequestration.	Increased carbon sinks, biodiversity conservation, and ecosystem service provision in natural habitats
2.2	Construction & Demolition (C&D) Waste	Upfront carbon	Manages construction and demolition waste through segregation, processing, and recycling to minimize environmental impacts and promote resource efficiency.	promotion of circular economy principles in waste management
		End-of-Life Carbon	Promotes the use of recycled materials in construction activities, reducing the demand for virgin resources and minimizing environmental footprint.	promotion of sustainable material sourcing
2.3	National Action Plan on Climate Change (NAPCC) – 2008	Operational Carbon	Addresses climate change through a range of adaptation and mitigation measures, promoting sustainable development and low-carbon growth pathways.	Integrated approach to climate change mitigation and adaptation, promotion of sustainable development, and alignment with national priorities.
		Whole-Life Carbon	Encourages the development and deployment of renewable energy technologies to reduce dependence on fossil fuels and mitigate greenhouse gas emissions.	Increased renewable energy capacity, reduced carbon emissions from the power sector, and promotion of energy security.
3	**Safety & Regulatory Policies- National Building Code (NBC) – 2016**			
3.1	Energy Efficiency (Part 11: Approach to Sustainability)	Operational Carbon	Sets standards for building design, construction, and maintenance, ensuring structural safety, fire safety, and energy efficiency in buildings.	Enhanced building safety, improved energy performance
4	**Urban Planning & Smart City Policies**			
4.1	Smart Cities Mission – 2015	Operational Carbon	Focuses on urban development through smart solutions, infrastructure upgrades, and citizen engagement, promoting sustainable and resilient urban environments.	Potential long-term urban carbon savings

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		Upfront Carbon	High impact (reduces material use & landfill demand).	Waste Management & Circular Economy
		Beyond Life Cycle	long-term urban carbon savings, resilience, energy and water benefits.	Recycled materials contribute to future projects, EV grid integration supports future
4.2	Pradhan Mantri Awas Yojana (PMAY) – 2015	Upfront Carbon	Use of Precast & Modular Construction	High impact (potential for material reuse)
		Operational Carbon	Energy-Efficient Housing (Eco-Niwas Samhita Compliance)	potential energy savings for future residents
		End-of-Life Carbon	Use of Locally Sourced & Recycled Materials	High impact (easier material recovery)
		Beyond Life Cycle	Solar Energy Integration in PMAY-Urban	Long-term renewable energy benefits
5	**Infrastructure & Material Efficiency Policies: Fly Ash Utilization Policy – 1999**			
	Fly Ash Strategy	Upfront Carbon	High impact (reduces clinker demand, lowering CO_2 emissions)	High impact (reused in new concrete)
		End-of-Life Carbon	Use of Fly Ash in Road Construction	High impact (reduces landfill disposal of fly ash)

Table: 2- Summery of Carbon emissions related Policies in India

Source: Authors

(Definitions- Operational Carbon- Electricity consumption, HVAC systems, water heating, elevators, etc., *Embodied Carbon-* production, transportation, and installation of Cement, steel, glass, bricks, transportation of materials, construction processes, *Upfront Carbon* (a subset of embodied carbon)- Carbon emissions released before a building is operational, including raw material extraction, manufacturing, transportation, and construction activities. *Sequestered Carbon-* Carbon that is naturally captured and stored by materials or ecosystems over time. *Avoided Carbon-* Emissions that are prevented due to specific sustainable choices in design and material selection. *Biogenic carbon-* Carbon that is stored in biomaterials. *End-of-Life Carbon-* Emissions generated at the end of the life of the material or the building. *Beyond Life Cycle-* refers to the long-term carbon impacts of a building after its operational and end-of-life phases.)

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Likewise, a more holistic approach to mitigating operational, embodied, sequestered, and other carbon in the construction industry should be incorporated. Various existing agencies /departments (govt- non govt) like National Action Plan on Climate Change (NAPCC), Rain Forest Research Institute (RFRI): Based in Jorhat, Assam, Global Alliance for a Sustainable Planet (GASP), Varaha etc can actively perform in between. These bodies can also issue certificates which can be mandated in the process of Green Building rating frameworks for the projects in industry. There is also a need for capacity building for more education and training to enable people to manage carbon credit programs at various levels and to create the capability to implement them effectively. Another challenge is the potential for *carbon leakage*, when the cost-driven shifts in production or there is a change in market dynamics leading to relocation/ reestablishment of huge industries in new regions, transportation related emissions etc. In such conditions, emission reductions in one sector are offset by increases in emissions in another sector. Opportunities exist for India to establish strengthen regulations to mitigate the carbon leakages, for example Carbon Border Adjustment Mechanisms (CBAM) exist in Europe. Similar initiative can be taken at National and Global levels. China and India are major emitters and have substantial potential to create carbon credits for selling to other regions (Siriwardana & Nong, 2021). India can leverage its relatively low emission abatement costs compared to developed countries to create carbon credits for selling to other regions. By implementing appropriate policies and regulations, India can unlock the full potential of carbon trading to achieve its climate goals and promote sustainable development. The government can develop Voluntary Carbon Markets in India by ensuring the environmental integrity of carbon credits through robust standards, verification, and accreditation to build confidence among investors and end-users. This will create a large job market in carbon sink locations in the country, incentivizing the interest of the private sector.

7. Conclusion:

The paper has explored global carbon credit markets and policy frameworks in India that mitigate carbon emissions. The carbon credit trading system is at a nascent stage in India, and for the construction industry is growing very fast, its significant carbon emissions at various stages of constructions requires means of measuring, reporting, mitigating and monitoring specific strategies as per *table-2.* Policies frameworks can be comprehensive to explore to handle the operational carbon at construction level, which can be incentivised in Carbon credits. For the effective implementation of the entire Carbon Credit Trading system in India, there is a need for setting up regulatory and functioning bodies at the National and Global levels as suggested above, and formulation of policies in the construction sector addressing Carbon emissions. Ensuring compliance with Global Accounting Standards, effective Tax Planning, access to Multi-commodity Exchange Markets, as well as robust certification, verification, and enforcement procedures are essential for the proper execution of emission-trading initiatives (Sarkar & Dash, 2011). India needs to harmonize its carbon credit trading system with international standards and practices to

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facilitate cross-border trading and attract foreign investment. This involves aligning methodologies for quantifying, monitoring, reporting, and verifying emission reductions, which could be achieved through collaboration with international organizations and participation in global carbon market initiatives.

8. Way forward:

Blockchain technology can enhance the transparency and efficiency of carbon trading. Carbon trading essentially trades the right to emit greenhouse gases (Yu & Zhennan, 2011). In an integrated carbon reduction policy framework, balancing the relationship between emission reductions and low-carbon benefits has been found to be a critical issue for governments and enterprises in both theoretical research and carbon emission reduction practices (Zhang et al., 2017). Policies such as carbon taxes and emissions trading systems have emerged as key instruments for governments to mitigate climate change.

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