



Green Carbon Credit Program in India: Advancing Sustainable Development and Climate Action

Kandarp Mehta
Sr Business Analyst
IIM Ahmedabad

Abstract:

This policy paper presents an overview of the Green Carbon Credit Program to combat climate change and promote sustainable development. The paper discusses the concept of carbon credits, their role in mitigating greenhouse gas emissions, and the potential benefits of implementing a green carbon credit program. Additionally, the paper explores the challenges associated with such a program and offers policy recommendations for effective implementation and governance.

Introduction:

In the face of accelerating climate change and the urgent need to reduce greenhouse gas emissions, innovative solutions promoting environmental sustainability and economic growth have become paramount. One such solution that has gained significant traction in recent years is the Green Carbon Credit Program. This program provides a pathway for businesses and organizations to contribute to the fight against climate change while harnessing economic opportunities.

The Green Carbon Credit Program is based on the concept of carbon credits, a mechanism designed to incentivize the reduction of carbon dioxide (CO₂) and other greenhouse gas emissions. It offers a structured framework for businesses to participate actively in the transition towards a low-carbon economy. Companies can earn carbon credits by engaging in sustainable practices and projects that decrease emissions, which can be traded in the carbon market.

The underlying principle of the program lies in recognizing the value of emissions reductions and providing a financial incentive for businesses to adopt cleaner technologies, improve energy efficiency, and invest in renewable energy sources. The credits earned can then be sold or traded to other companies seeking to offset their emissions, effectively creating a market-driven mechanism to encourage emission reductions and promote sustainable practices.

The benefits of the Green Carbon Credit Program are twofold. Firstly, it enables organizations to mitigate their environmental impact and actively contribute to global efforts to combat climate change. By implementing emission reduction initiatives, businesses can significantly reduce their carbon footprint and align their operations with international climate goals. This proactive approach helps safeguard the environment and enhances a company's reputation as a responsible corporate citizen, increasing consumer trust and loyalty.

Secondly, the program fosters economic growth and stimulates sustainable development. The Green Carbon Credit Program encourages innovation and investment in clean technologies by incentivizing emission reductions. This creates new market opportunities, drives job creation in green industries, and supports the transition to a low-carbon economy. Moreover, it can attract foreign investment and partnerships as countries and organizations increasingly prioritize sustainable practices and seek to collaborate with environmentally responsible entities.

The Green Carbon Credit Program offers a win-win scenario for the environment and the economy. It aligns the interests of businesses with global sustainability goals, enabling them to address climate change while reaping economic benefits. By

participating in this program, organizations can transform their sustainability efforts into tangible financial rewards, driving long-term change and shaping a more sustainable future for future generations.

In the following sections, we will explore the mechanics of the Green Carbon Credit Program in more detail, examining its implementation, potential challenges, and transformative potential for both environmental and economic progress.

Carbon Credit

Carbon credits are a vital component of carbon trading, a market-based approach to mitigating greenhouse gas emissions and combating climate change. Carbon credits emerged to incentivize and financially support activities that reduce or remove greenhouse gas emissions from the atmosphere.

History of Carbon Credits

The idea of carbon credits traces back to the early 1990s when international efforts to address global climate change led to the United Nations Framework Convention on Climate Change (UNFCCC) in 1992. This convention aimed to stabilize greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous human interference with the climate system.

In 1997, the Kyoto Protocol was adopted under the UNFCCC, establishing legally binding emissions reduction targets for developed countries (Annex I countries). These countries were required to collectively reduce their greenhouse gas emissions by an average of 5.2% below 1990 levels during the commitment period 2008-2012.

The Kyoto Protocol introduced three flexible mechanisms to help countries achieve their emission reduction targets: Clean Development Mechanism (CDM), Joint Implementation (JI), and Emissions Trading (ET). It is the Emissions Trading mechanism that laid the groundwork for carbon credits.

Carbon Credits and Emissions Trading:

Emissions Trading allows countries or entities that have exceeded their emission reduction targets to sell their surplus allowances to countries or entities that have not achieved their targets. One emission allowance represents the right to emit one tonne of carbon dioxide equivalent (CO₂e) or other greenhouse gasses.

Carbon credits are the tradable units of emission reductions or removals. They are generated when a project or activity reduces greenhouse gas emissions below a baseline level. The reduction in emissions is measured in CO₂e and is verified by an independent third party. Once verified, the project is issued a specific number of carbon credits, each representing one tonne of CO₂e emissions reduced.

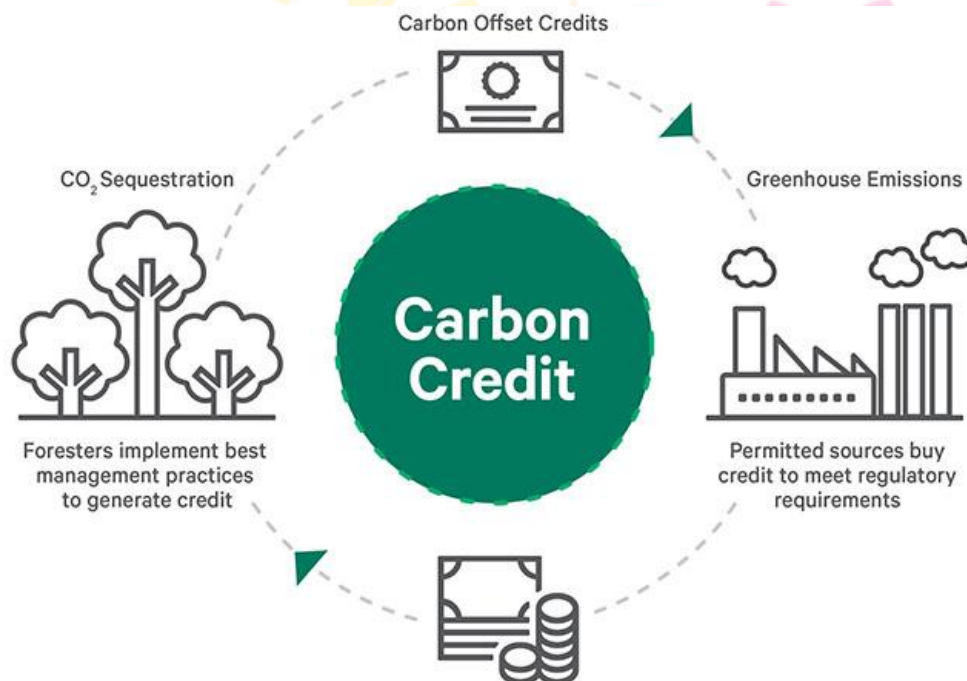


How Carbon Credits Work:

Imagine a company that produces many CO₂ emissions due to its operations. The company can purchase carbon credits to meet emission reduction targets or regulations.

- **Implement Emission Reduction Projects:** The company invests in projects that help reduce carbon emissions, like upgrading to energy-efficient equipment or adopting renewable energy sources.
- **Generate Carbon Credits:** As a result of these emission reduction efforts, the company generates carbon credits equivalent to the amount of CO₂ emissions it has successfully avoided or reduced.
- **Compliance and Offset:** By purchasing these carbon credits, the company offsets its excess emissions and complies with emission reduction regulations. The carbon credits represent a tangible way for the company to demonstrate that it is actively working to reduce its carbon footprint.
- **Supporting Sustainable Projects:** The revenue from the sale of carbon credits supports sustainable projects, allowing them to continue their efforts in reducing CO₂ emissions and promoting environmental sustainability.

Carbon credits are a market-based approach to tackling climate change and reducing greenhouse gas (GHG) emissions. The concept involves assigning a monetary value to reducing, avoiding, or removing one metric ton of carbon dioxide equivalent (CO₂e) emissions. The ultimate goal is to encourage individuals, organizations, and countries to reduce their carbon footprint by investing in projects that reduce emissions.

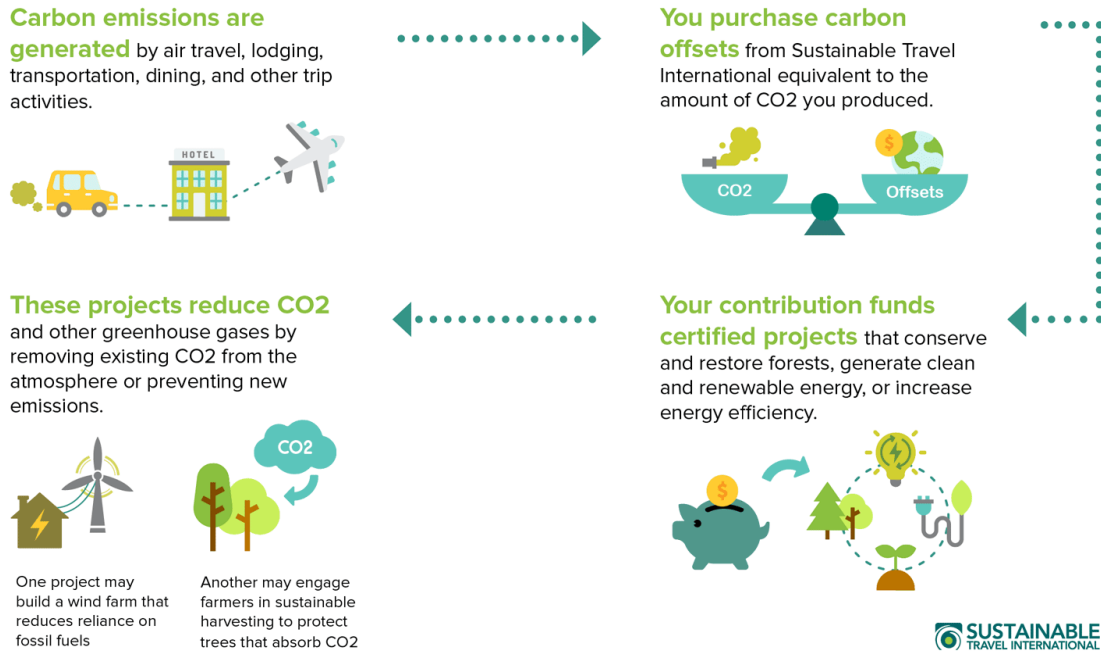


<https://www.davy.ie/market-and-insights/insights/marketwatch/2021/july-2021/what-are-carbon-credits.html>

Carbon Credit has different segmentation based on Industries as well. In 2022 aviation accounted for 2% of global energy-related CO₂ emissions¹. We can clearly see how Carbon credit will work for the Aviation industry from the below chart.

Research Through Innovation

¹ <https://www.iea.org/energy-system/transport/aviation>



(Ref-<https://sustainabletravel.org/how-carbon-offsets-work/>)

Carbon Offset Projects: These are initiatives or activities that aim to reduce emissions or remove greenhouse gases from the atmosphere. For example, renewable energy projects (e.g., wind farms, solar installations), afforestation or reforestation projects, energy efficiency initiatives, or methane capture at landfills are all common types of carbon offset projects.

Verification and Certification: Independent auditors review and verify the emissions reductions achieved by the project. They ensure the project adheres to established standards and methodologies for calculating carbon reductions.

Issuance of Carbon Credits: Once verified, the project is issued a specific number of carbon credits, usually one credit for each tonne of CO2e emissions reduced.

Carbon Trading: These carbon credits can then be traded on the carbon market. Companies or entities with carbon reduction targets or obligations can purchase these credits to offset their own emissions. They effectively balance their emissions and contribute to global emission reduction efforts by doing so.



Purpose of Carbon Credits:

Carbon credits aim to incentivize and facilitate the reduction of greenhouse gas (GHG) emissions and combat climate change. Carbon credits function as a market-based tool to encourage individuals, organizations, and countries to take action to reduce their carbon footprint and contribute to global efforts to mitigate the impacts of climate change. The primary goals of carbon credits are:

1. **Emission Reduction Incentive:** By assigning a monetary value to each ton of CO₂e reduced, carbon credits create a financial incentive for businesses and governments to invest in emission reduction projects. This encourages entities to adopt cleaner technologies, improve energy efficiency, invest in renewable energy, and implement other measures to reduce their emissions.
2. **Market-Driven Approach:** Carbon credits establish a market for emissions reductions, allowing buyers and sellers to participate in a voluntary or regulated carbon market. This market mechanism facilitates the flow of capital towards projects that effectively reduce emissions, supporting the development of sustainable practices and technologies.
3. **Global Cooperation:** Climate change is a global challenge that requires collaboration across borders. Carbon credits provide a framework for international cooperation, enabling countries with more ambitious emission reduction targets to assist those facing challenges in achieving their goals. This fosters a sense of shared responsibility in addressing climate change globally.
4. **Promoting Sustainable Development:** Many carbon offset projects focus on sustainable practices, such as afforestation, reforestation, renewable energy generation, and waste management. By supporting such projects, carbon credits can contribute to sustainable development and environmental conservation.
5. **Carbon Neutrality and Offset Programs:** Carbon credits allow individuals and organizations to offset their unavoidable emissions by investing in emission reduction projects elsewhere. This supports the concept of carbon neutrality, where an entity aims to balance its emissions with equivalent carbon credits, effectively neutralizing its net carbon footprint.
6. **Compliance with Regulations:** In some regions, governments may introduce carbon pricing mechanisms or cap-and-trade systems, mandating certain industries or entities to offset a portion of their emissions with carbon credits. Compliance with these regulations helps countries and businesses meet their emission reduction targets.
7. **Funding for Climate Projects:** The revenue generated from carbon credit sales can be reinvested in further emission reduction projects, research and development of clean technologies, and other climate-related initiatives.

Benefits of carbon credits:

- **Emission Reduction and Climate Change Mitigation:** Carbon credits incentivize businesses, governments, and individuals to reduce greenhouse gas emissions. By encouraging emission reduction projects and practices, carbon credits help mitigate the impacts of climate change, such as rising temperatures, extreme weather events, and sea-level rise.
- **Promotion of Renewable Energy and Clean Technologies:** Carbon credits incentivize investments in renewable energy sources like wind, solar, and hydroelectric power. This promotes the transition from fossil fuels to cleaner, more sustainable energy alternatives, reducing reliance on carbon-intensive energy generation.
- **Support for Sustainable Practices and Conservation:** Many carbon offset projects focus on sustainable practices, such as reforestation, afforestation, and sustainable land management. These projects sequester carbon and contribute to biodiversity conservation and ecosystem restoration.
- **Global Collaboration and Shared Responsibility:** Carbon credits facilitate international cooperation in addressing climate change. Developed countries can support emission reduction projects in developing nations, fostering a shared responsibility in tackling a global challenge affecting all nations.
- **Encouragement of Green Innovation:** The carbon credit market provides a platform for innovative climate solutions and technologies. Businesses and entrepreneurs are incentivized to develop and implement novel approaches to reduce emissions, driving green innovation and technological advancements.
- **Economic Opportunities and Job Creation:** The transition to a low-carbon economy opens up new economic opportunities and industries centered around clean technologies, renewable energy, and sustainable practices. This transition can create jobs and stimulate economic growth.
- **Corporate Social Responsibility and Reputation:** Companies can use carbon credits to offset their carbon footprint and demonstrate their commitment to environmental responsibility. This can enhance their reputation among consumers, investors, and stakeholders.
- **Financial Support for Developing Countries:** Carbon credit projects often provide financial support to developing countries, which can be critical in funding sustainable development initiatives and improving livelihoods in vulnerable communities.
- **Carbon Neutrality for Organizations:** Carbon credits enable organizations to achieve carbon neutrality by offsetting their unavoidable emissions. This aligns with sustainability goals and strengthens their environmental credentials.

- **Compliance with Regulatory Requirements:** In regions with carbon pricing mechanisms or cap-and-trade systems, carbon credits help businesses and industries comply with emission reduction regulations and avoid penalties.
- While carbon credits offer these benefits, it's important to ensure the integrity and effectiveness of the projects generating the credits. Robust verification and certification processes are essential to ensure that emission reductions are real, additional, and verifiable. Additionally, carbon credits should be seen as part of a comprehensive climate strategy that includes direct emission reductions, policy interventions, and public engagement to achieve meaningful and long-lasting impacts on climate change.

In India, the carbon market is primarily driven by Clean Development Mechanism (CDM) and voluntary carbon markets.

- **Clean Development Mechanism (CDM):** CDM is a project-based mechanism under the Kyoto Protocol that allows developed countries to invest in emission reduction projects in developing countries. These projects generate carbon credits, Certified Emission Reductions (CERs), which can be traded internationally. In India, CDM projects have focused on various sectors, including renewable energy, energy efficiency, waste management, and afforestation. The generated CERs can be sold to entities in developed countries to offset their emissions.
- **Voluntary Carbon Markets:** Apart from the regulated CDM market, India has a growing voluntary carbon market. This market allows organizations, governments, and individuals to voluntarily offset emissions by purchasing carbon credits. These credits are typically generated from projects not registered under the CDM mechanism. Voluntary carbon markets in India allow businesses to demonstrate their commitment to sustainability and support projects with positive environmental and social impacts.

Challenges

- **Monitoring, Reporting, and Verification (MRV):**

Accurate measurement and verification of emission reductions are crucial for the credibility and integrity of a green carbon credit program. Robust MRV systems should be established to ensure transparency, accountability, and the prevention of double counting. Governments and international bodies should collaborate to develop standardized MRV protocols and enhance capacity-building efforts.

- **Additionality and Baseline Setting:**

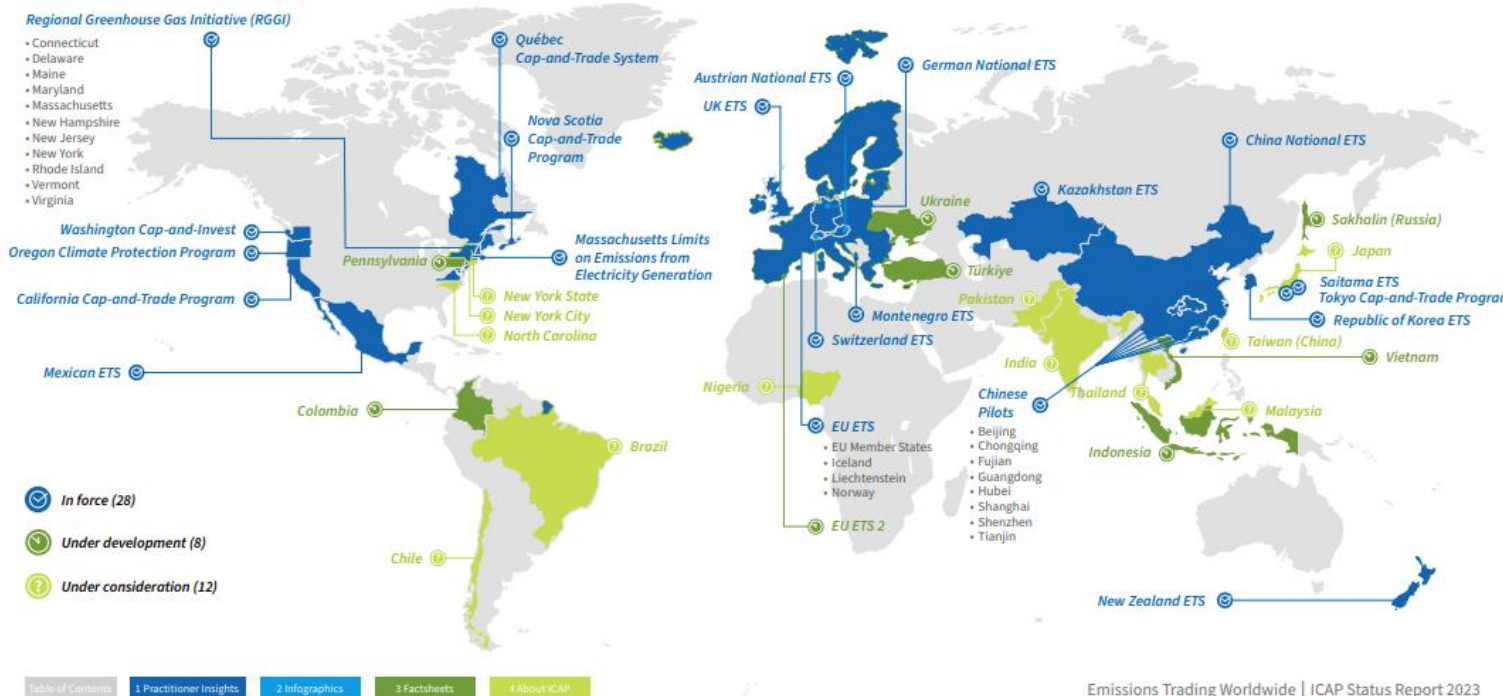
Projects eligible for carbon credits should demonstrate additionality, meaning the emission reductions or carbon sequestration achieved are beyond business-as-usual scenarios. Clear guidelines and methodologies must be established to determine baseline emissions and calculate the net emission reductions. Independent accreditation bodies should certify the eligibility of projects to maintain program integrity.

- **Social and Environmental Safeguards:**

A green carbon credit program should incorporate robust safeguards to avoid negative social and environmental impacts. Stakeholder consultation, community engagement, and the protection of Indigenous rights should be integral to project development. Additionally, measures should be in place to prevent land-use conflicts, ensure equitable distribution of benefits, and uphold human rights standards.

Carbon Credit implemented

The ICAP ETS(Emission Trading Scheme) world map showcases the current status of emissions trading systems, those in development, and those under consideration. As of January 2023, 28 ETSs are currently in operation. Additionally, eight more ETSs are in the development phase and are expected to become operational in the coming years. These upcoming systems include ETSs in Colombia, Indonesia, and Vietnam. Furthermore, twelve jurisdictions are exploring possibly incorporating an ETS into their climate change policy mix. Notably, Nigeria is depicted as the first African jurisdiction to consider an ETS. In the map, jurisdictions with multiple systems in force are represented in blue, with their borders depicting the layered systems (e.g., Germany and Guangdong). In cases where a jurisdiction has an operational system and is also developing an additional one, it is represented in blue with a green border (e.g., the EU).



Implementing Carbon Credit

In the Indian context, implementing effective carbon credit schemes is essential to address the country's significant carbon emissions and contribute to global climate goals. Here are some specific schemes and details on how they can be implemented for the better in India:

- **National Cap-and-Trade System:** Establish a national cap-and-trade system that covers major industries and sectors responsible for a significant share of carbon emissions. This system would set an overall emissions cap for these industries, and companies would be required to hold carbon credits equivalent to their emissions.
- **Improvement:** Set ambitious emission reduction targets aligned with the country's climate commitments. Regularly review and adjust the cap to ensure it aligns with emission reduction goals. Support industries in transitioning to cleaner technologies and processes through financial incentives and capacity-building initiatives.
- **Carbon Tax:** Implement a carbon tax on fossil fuels and high-emission activities to incentivize businesses and individuals to reduce their carbon footprint.
- **Improvement:** Ensure that the carbon tax rates are set at levels that drive emission reductions without causing undue hardship to vulnerable populations. Use the revenue generated from the carbon tax to fund renewable energy projects, research, and climate adaptation measures.
- **Renewable Energy Certificates (RECs):** Expand the use of Renewable Energy Certificates, which represent the environmental attributes of renewable energy generation, to promote the uptake of renewable energy.
- **Improvement:** Streamline the REC trading process and ensure transparency in issuing and trading RECs. Encourage the integration of renewable energy into the grid through supportive policies and incentives.
- **Afforestation and Reforestation Projects:** Encourage afforestation and reforestation projects to sequester carbon and enhance biodiversity.

- Improvement: Offer financial incentives and support to landowners and communities engaged in afforestation and reforestation projects. Implement proper monitoring and verification mechanisms to ensure the success and permanence of these projects.
- Voluntary Carbon Markets: Promote the voluntary carbon market to enable businesses and individuals to offset their carbon emissions voluntarily.
- Improvement: Develop standardized guidelines for certifying and validating voluntary carbon offset projects. Create awareness campaigns to educate the public about the importance of carbon offsetting and its role in combating climate change.
- Clean Energy Innovation: Invest in research and development of clean energy technologies, energy-efficient practices, and sustainable agriculture methods.
- Improvement: Increase funding for research institutions and startups working on clean energy solutions. Foster collaborations between academia, industry, and government agencies to accelerate the adoption of innovative technologies.
- International Partnerships: Collaborate with other countries and international organizations to facilitate carbon trading and access international climate finance.
- Improvement: Engage in international negotiations to enhance India's role in the global carbon market. Establish partnerships for technology transfer and capacity-building initiatives to help developing countries adopt cleaner technologies.
- Social and Environmental Considerations: Ensure that carbon credit schemes prioritize social equity, community engagement, and environmental sustainability.
- Improvement: Include social and environmental impact assessments in project evaluation processes. Involve local communities and indigenous groups in decision-making and share the benefits of carbon credit projects with them.



Recommendation

National Green Credit Program

Carbon Credit Certification and Trading Platform:

- Establish a robust and transparent carbon credit certification and trading platform to track and validate emission reductions.
- Companies that successfully reduce their emissions below their baseline levels will be eligible to receive certified carbon credits based on the amount of CO₂ equivalent emissions reduced.

Emission Baseline Setting:

- The government will set sector-specific emission baselines, considering historical emission levels, technological advancements, and international best practices.
- Participating companies will be assigned emission reduction targets based on these baselines.

Technology and Innovation Support:

- Encourage technology adoption and innovation in emission reduction through financial incentives, research grants, and technology collaboration programs.
- Companies that invest in and adopt cleaner technologies will be eligible for additional carbon credits.

Renewable Energy Integration:

- Promote the adoption of renewable energy sources by offering bonus carbon credits to companies that generate or procure a significant portion of their energy from renewable sources.
- Support the development of renewable energy infrastructure and facilitate easy access to the grid for renewable energy producers.

Incentives for Afforestation and Reforestation:

- Offer carbon credits for afforestation and reforestation projects to encourage sustainable land use and enhance carbon sequestration.
- Support local communities and private landowners in undertaking afforestation and reforestation activities.

Community and Social Co-benefits:

- Emphasize the importance of community and social co-benefits in carbon credit projects.
- Projects that provide socio-economic benefits to local communities, such as job creation and improved livelihoods, will be prioritized.

Public Awareness and Education:

- Conduct nationwide public awareness campaigns to educate businesses and individuals about the NGCP and the importance of carbon reduction.
- Engage with educational institutions to incorporate climate change and sustainability topics into the curriculum.

Rural Carbon Partnerships Programme (RCP)

- Awareness and Engagement: Educate rural communities on climate change and sustainable practices, collaborating with local leaders.
- Project Implementation: Assist rural areas in executing eco-friendly projects, offering resources and training for effective implementation.
- Carbon Credits for Progress: Measure emissions reductions, issue carbon credits, and establish a trading platform to boost rural development and environmental sustainability.

For example, let's consider a steel manufacturing company in India. The company's emission baseline, determined based on historical emissions, is set at 100,000 metric tons of CO₂ equivalent per year. The government assigns the company an emission reduction target of 20% below the baseline, i.e., 80,000 metric tons of CO₂ equivalent per year.

The company implements various emission reduction measures, such as energy efficiency improvements, using cleaner fuels, and optimizing production processes. As a result, it successfully reduces its emissions to 75,000 metric tons of CO₂ equivalent per year, surpassing its target by 5,000 metric tons.

The government certifies the emission reduction and issues 5,000 carbon credits to the company, each representing one metric ton of CO₂ equivalent emissions reduced. These credits can be traded on the NGCP platform, allowing the company to monetize its emission reductions.

To incentivize renewable energy adoption, the government also provides the company with 1,000 bonus carbon credits for procuring 30% of its energy from renewable sources.

The company can use these carbon credits in multiple ways:

- Sell the credits on the carbon market to other companies looking to offset their emissions.
- Hold the credits for future use to meet future emission reduction targets.
- Redeem the credits to the government to meet compliance requirements or use them as evidence of sustainability efforts to attract investors and customers.
- By implementing the NGCP, India can create a dynamic and effective market-driven mechanism to drive emission reductions, encourage sustainable practices, and contribute to the global fight against climate change while promoting economic growth and development.

Reference:

- ScienceDirect::[https://www.sciencedirect.com/topics/earth-and-planetary-sciences/kyoto-protocol#:~:text=The%20Kyoto%20Protocol%2C%20a%20legally,\(the%20first%20commitment%20period\)](https://www.sciencedirect.com/topics/earth-and-planetary-sciences/kyoto-protocol#:~:text=The%20Kyoto%20Protocol%2C%20a%20legally,(the%20first%20commitment%20period))
- ICAP (International Carbon Action Partnership):
<https://icapcarbonaction.com/en/publications/emissions-trading-worldwide-2023-icap-status-report>
- International Energy Agency (IEA):
<https://www.iea.org/energy-system/transport/aviation>
- Press Information Bureau (PIB):
<https://pib.gov.in/PressReleasePage.aspx?PRID=1923458>
- India RE Navigator:
<https://india-re-navigator.com/utility>
- Wiley Online Library:
<https://onlinelibrary.wiley.com/doi/epdf/10.1002/gch2.202200158?src=getftr>