



## **CARBON CREDIT MECHANISMS: A PATHWAY TO ENVIRONMENTAL SUSTAINABILITY AND ECONOMIC VIABILITY**

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### **Abstract**

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*The concept of Carbon credits originated from the Kyoto Protocol adopted into 1997 in Kyoto, Japan and came into force from 16<sup>th</sup> February 2005, is a global agreement designed to decrease worldwide greenhouse gas emissions. The protocol assigns emission reduction targets to member countries, and carbon credits offer a flexible method for countries and businesses to achieve these targets. This paper aims to focus on the conceptual framework of carbon credit trading mechanism to foster the environmental sustainability and positive environmental changes. The Carbon Credit market functions by means of carbon trading system, facilitates the exchange of carbon credits between buyers and sellers. Carbon credits play a crucial role in international endeavours to address climate change by providing incentives for activities aimed at reducing emissions. With the global community intensifying its endeavours to address climate change and shift towards a low-carbon economy, carbon credits are anticipated to assume a more prominent position. Carbon Credits are an essential instrument in combating climate change, offering a market-driven method to encourage the reduction of emissions and promote sustainable development on a global scale. In Conclusion, this article provides an insight into internationally adopted trading mechanism for carbon credit to enhance the sustainability. It plays a vital factor for the environmental accounting practices.*

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**Key Words:** Carbon Credit, Kyoto Protocol, Environmental Sustainability, Environmental Accounting

### **1. Introduction:**

The underlying concept of carbon credits is to stimulate investments in initiatives that contribute to the establishment of a low-carbon economy through the provision of monetary incentives for the reduction of emissions. However, the effectiveness of these measures and the potential for greenwashing in the absence of rigorous enforcement are also subjects of debate. Carbon credits are globally traded permits or certificates that function as a symbol of

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the right to emit one metric ton of carbon dioxide or its equivalent (CO<sub>2</sub>e) into the surrounding atmosphere of the Earth. In order to address the issue of greenhouse gas (GHG) emissions, market-based methods are utilized to assign a financial value to the carbon dioxide emissions that are prevented, reduced, or eliminated from the environment. In order to facilitate the exchange of carbon credits between buyers and sellers, the carbon credit market operates through carbon trading platforms. The values of carbon credits fluctuate as a result of the interaction between supply and demand, changes in legislation, and market sentiment.

The Carbon Credit Mechanism was the outcome of Kyoto Protocol adopted in 1997 and came into force from 2005 globally. The carbon market allows business houses to the purchase and sale of carbon credits. Carbon credits' prices swing up and down in response to market forces, shifting regulations, and supply and demand. Companies in areas with cap-and-trade systems can buy or sell credits that are based on their emissions. Each company is assigned a specific number of credits.

## **2. Classification of Carbon Credits:**

- *Certified Emission Reductions (CERs)*: Certified Emission Reductions (CERs) are produced as a result of Clean Development Mechanism (CDM) initiatives implemented in poor nations, with the aim of decreasing emissions or improving carbon sequestration.
- *Emission Reduction Units (ERUs)*: Produced via Joint Implementation (JI) initiatives in developed nations that lead to the reduction or elimination of emissions.

## **3. Objectives of Carbon Credit**

- Enhance international collaboration and facilitate the exchange of technology between developed and developing nations in order to expedite endeavours aimed at reducing emissions.
- Promoting the development and allocation of resources towards low-carbon technology and sustainable practices across diverse industries.

## **4. Creation of Carbon Credits**

These carbon credit registries facilitate the transfer and retirement of carbon credits in compliance with voluntary carbon markets by offering transparency and traceability. Carbon Credits have a diverse range of functions in mitigating the climate change, ranging from providing incentives for reducing emissions and encouraging sustainable practises to streamlining regulatory compliance and attracting climate investment. Stakeholders may leverage the potential of carbon markets to expedite the shift towards a sustainable and

resilient future for everybody by comprehending the process of creating and utilizing carbon credits. Here are some of the ways how a company can create and increase credits for emission of CO<sub>2</sub>.

- *Emissions Reduction Initiatives:* A variety of emissions reduction initiatives that either prevent or eliminate greenhouse gas emissions from the atmosphere produce carbon credits. These projects cover a wide range of tasks, such as the production of renewable energy (such as wind, solar, and hydro power), enhancements to energy efficiency, afforestation and reforestation, methane absorption from landfills or animals, and optimization of industrial processes.
- *Verification and Certification:* Emissions reduction projects must go through stringent verification and certification procedures carried out by certified third-party auditors in order to be eligible for carbon credits. The "5 C's" criteria—real, measurable, increased, verifiable, and permanent emission reductions—are ensured by these procedures. Upon approval, the project's verified emission reductions provide the basis for the issuance of carbon credits, which are commonly calculated in metric tons of carbon dioxide equivalent (CO<sub>2</sub>e).
- *Registry and Trading Platforms:* Carbon credits are tracked and registered in specific registries or trading platforms, such the Verified Carbon Standard (VCS), the Clean Development Mechanism (CDM) registry, or platforms for voluntary carbon markets.

## 5. Making Use of Carbon Credits

Activities aimed at reducing or eliminating greenhouse gas emissions are measured in terms of carbon credits. Usually, they are awarded in accordance with a reduction of one metric ton of emissions of carbon dioxide equivalent (CO<sub>2</sub>e). the trading mechanism is like- Businesses, governments, and individuals purchase carbon credits on a voluntary basis in voluntary markets in order to offset their emissions and fund climate mitigation initiatives. Organizations can improve their environmental credentials and stakeholder trust by tracking and reporting their volunteer carbon offset operations through the use of green accounting. Carbon Credits can be used in the following ways:

- *Compliance Markets:* In order to meet their legally-mandated emissions reduction targets, regulated businesses employ carbon credits inside compliance markets, such as the European Union Emissions Trading System (EU ETS) and regional cap-and-trade programs. Companies who are required to comply with emission restrictions can utilize

carbon credits as a means of ensuring compliance by offsetting their surplus emissions and avoiding penalties for non-compliance.

- *Voluntary Offsetting:* In addition to compliance requirements, companies, governments, and people can choose to buy carbon credits on a voluntary basis to reduce their carbon footprint and fund climate mitigation initiatives. By funding programs that have positive effects on the environment, society, and economy in addition to reducing emissions, such as the use of renewable energy sources, the preservation of forests, and community development projects, organizations can voluntarily off-set their carbon footprint.
- *Corporate Sustainability Strategies:* Carbon credits are essential to corporate sustainability strategies because they help businesses reach their goals of becoming carbon neutral or carbon neutral. In order to demonstrate environmental leadership and a commitment to climate action, organizations include carbon credits into their sustainability activities to balance their inevitable emissions with corresponding reductions or removals elsewhere.
- *Climate Finance and Investment:* Carbon credits are a source of climate finance that encourage investment in infrastructure that is resilient to climate change and initiatives aimed at reducing emissions. As part of their sustainable investment portfolios, impact funds, development finance organizations, and institutional investors frequently provide capital to carbon credit-generating projects, promoting innovation, technology transfer, and sustainable development outcomes in both developed and developing nations.
- *Carbon Pricing Mechanisms:* By giving businesses an adaptable and affordable way to meet their emission reduction commitments, carbon credits enhance the efficacy of carbon pricing mechanisms. Carbon credits encourage the shift to a low-carbon economy by creating a market-based price on carbon, which in turn motivates efforts to reduce emissions.
- *Voluntary and Compliance Markets:* Carbon credits can be traded in two distinct markets: voluntary and compliance. Government regulations mandate that industries to decrease their greenhouse gas emissions by participating in compliance markets such as the California Cap-and-Trade Program and the European Union Emissions Trading System (EU ETS). In order to meet their regulatory obligations, businesses have the

option to purchase carbon credits. If they have successfully decreased their emissions beyond the desired target, they can then sell the surplus credits.

## 6. How to Produce Carbon Credits

Following techniques are used to create carbon credits with the goal of lowering greenhouse gas emissions or removing carbon dioxide from the atmosphere. These techniques cover a wide range of tasks from many industries and areas. Here are a few typical techniques for producing carbon credits:

- *Renewable Energy Projects:* Creating carbon credits through renewable energy projects is one of the most common ways. Electricity from renewable resources including solar, wind, hydro, biomass, and geothermal energy is produced in these projects. Renewable energy projects lower greenhouse gas emissions and are eligible for carbon credits based on the quantity of emissions avoided by replacing fossil fuel-based electricity generation.
- *Energy Efficiency Improvements:* Reducing energy consumption and related emissions through the implementation of energy efficiency measures is another important strategy for the manufacture of carbon credits. Upgrades to appliances, transit networks, buildings, and industrial processes are a few examples of energy efficiency projects. Based on the documented energy savings realized, these projects produce carbon credits by optimizing energy consumption and cutting waste.
- *Afforestation and Reforestation:* Reforestation is the process of reestablishing forest cover in areas that have been cleared of trees or degraded; afforestation is the planting of trees on land that was not previously covered by trees. As trees mature and take up carbon through photosynthesis, afforestation and reforestation initiatives both sequester carbon dioxide from the atmosphere. The quantity of carbon dioxide sequestered by recently created or restored forests determines the issuance of carbon credits.
- *Methane Capture and Utilization:* Methane is a powerful greenhouse gas released from a number of sources, such as agricultural practices, wastewater treatment facilities, and landfills. Projects that trap methane emissions either burn the methane to destroy it or use it as a renewable energy source, keeping it from escaping into the atmosphere. The carbon credits that these projects produce is derived from the prevented methane emissions.
- *Industrial Process Optimization:* Businesses can put policies in place to streamline their operations and cut back on the emissions of greenhouse gases including nitrous oxide,

carbon dioxide, and methane. Changing to cleaner fuels, putting carbon capture and storage technology into practice, and increasing factory efficiency are a few examples. The quantifiable emissions reductions made possible by these process innovations are used to calculate the awarding of carbon credits.

- *Carbon Sequestration Projects:* Long-term carbon sinks can be created by removing carbon dioxide from the atmosphere using land management techniques including soil carbon sequestration and oceanic carbon capture and storage. By improving the amount of carbon stored in soils, plants, or geological formations, carbon sequestration programs help to offset emissions and produce carbon credits.
- *Clean Transportation Initiatives:* The transportation sector's emissions can be decreased by switching to greener forms of transportation like electric cars (EVs), public transportation, and alternative fuels. Initiatives that encourage the purchase of fuel-efficient automobiles, encourage the use of low-emission vehicles, or fund environmentally friendly transportation infrastructure can produce carbon credits.

## **7. Carbon Credit: Creation and Trading Mechanism:**

As a component of their sustainability strategy, businesses use carbon credit policies to reduce their carbon footprint and aid in the fight against climate change. businesses use carbon credit programs as a component of their larger sustainability plans to lessen their environmental effect, show corporate responsibility, and aid in international efforts to combat climate change. Companies may accelerate the shift to a low-carbon economy and drive climate action by including carbon offsetting into their sustainability activities.

- *Carbon Footprint evaluation:* Organizations begin by identifying sources of greenhouse gas emissions throughout their supply chain, value chain, and operations by performing a thorough evaluation of their carbon footprint. Quantifying emissions from a range of activities, such as energy use, transportation, manufacturing, and waste management, is part of this assessment.
- *Emissions Reduction objectives:* Companies set emissions reduction objectives that are in line with international accords and climate science, such as the Paris Agreement's aim of keeping global warming to far below 2 degrees Celsius, based on their assessment of their carbon footprint. These objectives could be ambitions for carbon neutrality, intensity-based objectives (such emissions per unit of production), or absolute targets for reducing emissions.

- *Internal Emissions Reduction Measures:* To lower their carbon footprint and meet their emissions reduction goals, businesses put internal emissions reduction measures into place. Increasing energy efficiency, switching to renewable energy sources, streamlining production procedures, cutting down on waste production, and supporting environmentally friendly logistics and transportation strategies are a few examples of these actions.
- *Carbon Offsetting:* Businesses who are unable to completely eliminate their emissions through internal measures may choose to invest in carbon offset projects in addition to their internal efforts to reduce emissions. By lowering or eliminating greenhouse gas emissions somewhere else—for example, through reforestation, the development of renewable energy sources, methane collection, or community-based sustainability initiatives—carbon offset projects provide carbon credits.
- *Buying Carbon Credits:* Businesses can buy carbon credits on carbon markets from brokers or from developers of carbon offset projects. Companies utilize these carbon credits to offset their own emissions since they represent verifiable emissions reductions or removals accomplished by the projects. Depending on their priorities for the environment, the quality of the project, and budget, businesses can purchase carbon credits from a range of project kinds and places.
- *Certification for Carbon Neutrality:* Certain businesses strive to become carbon neutral by offsetting their residual emissions with corresponding emissions removals or reductions elsewhere. To show their dedication to carbon neutrality, businesses may pursue carbon neutral certification or verification from outside agencies after putting internal emissions reduction plans into place and acquiring carbon credits to offset their remaining emissions.
- *Stakeholder Engagement and Reporting:* Businesses interact with investors, clients, staff members, and the general public to share information about their efforts to reduce carbon emissions and offset those emissions. Accountability is improved and stakeholder confidence is cultivated through transparent reporting of carbon emissions, emissions reduction objectives, purchases of carbon offsets, and sustainability activities.

## 8. Carbon Credit: Boosts up Biodiversity

When used with sustainable land management techniques, carbon credits can provide biodiversity conservation with a number of benefits. The following are some ways that carbon credits support biodiversity:

- *Habitat Conservation:* Reforestation and afforestation programs are examples of carbon offset projects that can aid in the preservation and restoration of natural ecosystems. These programs support biodiversity conservation by establishing new wildlife habitats and corridors through the planting of trees or the restoration of degraded forests. Reforestation initiatives can also aid in the preservation of threatened species and the recovery of ecosystems that have been harmed by habitat fragmentation or deforestation.
- *Enhanced Ecosystem Services:* Pollination, clean water, soil fertility, and climate management are just a few of the many vital services that healthy ecosystems offer. Projects utilizing carbon credits with an emphasis on conservation and restoration of ecosystems can improve these ecosystem services, which will boost ecological resilience and biodiversity. Reforestation initiatives, for instance, can reduce soil erosion, enhance water quality, and lessen the negative effects of climate change on nearby populations and wildlife.
- *Endangered Species Protection:* High conservation value sites, including vital habitats for endangered species or biodiversity hotspots, are frequently protected as part of carbon offset initiatives. Carbon credit projects help to preserve biodiversity and protect vulnerable species by protecting these regions from dangers such as habitat degradation and deforestation. The health and functionality of ecosystems may benefit in a cascade manner from this.
- *Promotion of Sustainable Land Management:* Carbon credit schemes encourage sustainable land management strategies that place an emphasis on sequestering carbon dioxide while also protecting biodiversity. Agroforestry systems, for instance, can increase soil fertility, boost biodiversity, and trap carbon in biomass and soil organic matter. They also integrate trees with agricultural crops. Carbon credits encourage landowners and communities to embrace more ecologically sound and sustainable land-use practices by funding such practices.
- *Community Engagement and Livelihood Improvement:* A lot of carbon credit initiatives include local communities in the planning and execution of the project, offering chances



for strengthening capacity and enhancing livelihoods. Carbon credit schemes can encourage local stewardship of natural resources and a sense of ownership over biodiversity conservation efforts by integrating people in conservation activities including reforestation, habitat restoration, and sustainable land management.

- *Long-Term Conservation Financing:* The cash generated by carbon credits can offer biodiversity conservation programs a stable and sustainable source of funding. Carbon credit schemes create revenue by commercializing the ecosystem services that healthy ecosystems offer. This revenue can then be used to fund conservation efforts like managing protected areas, observing species, and restoring habitats. This long-term funding source contributes to the upkeep of landscapes rich in biodiversity and their protection.

## 9. Conclusion:

In General Conclusion, Carbon Credit plays a vital role in the using the practices of lowering greenhouse gas effects. Carbon Credits are essential because they let businesses take responsibility for the reduction of their greenhouse gas emissions. To become carbon neutral or lower their net carbon footprint, businesses can buy carbon credits to offset their inevitable emissions. Organizations show their dedication to reporting that is transparent and environmentally sustainable by incorporating carbon credits into their financial accounts.

Carbon Credits are essential to environmental accounting procedures since they let businesses measure, control, and offset their greenhouse gas emissions. In the shift to a low-carbon economy, companies can improve their environmental performance, reduce risks, and seize new market opportunities by incorporating carbon credits into their sustainability initiatives. Carbon credit programs can help to reduce climate change and maintain ecosystems, species, and ecological processes by coordinating carbon offset initiatives with biodiversity conservation goals and putting strong monitoring and verification procedures in place.