

PROSPECTS AND CHALLENGES OF CARBON CREDIT TRADING IN INDIA

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ABSTRACT

Our earth is fronting the worldwide problematic condition of climate change. The problem arises due to anthropogenic activities which result in emissions of CO₂ and other GHG (Greenhouse gases) in the eco-system. Human actions such as industrial developments, burning of fossil fuel, and increase in the population. To condense and overwhelmed this delinquent of climate change, and to safeguard mother earth from the antagonistic effect of global warming, CO₂ and Greenhouse gases emission must be reduced significantly. To accomplish this goal line, the idea of carbon credit came up. The alleged concept of carbon trading is innovative and applicable in the real world towards environmental conservation. Carbon trading is one such concept that has two effects first, it helps in balancing the emission of harmful gases. Secondly, it is considered as a money-making opportunity and develops a Carbon commodity market. For developing nations alike India, Carbon Credit Trading grants upright prospects of trading with developed nations. Thus, it helps in appealing to more investors. However, carbon credit trading grieves from the restrictions of tax-related frauds, the uncertain linking from latent members, ecological disparity, and high price sensitivity. The paper is descriptive in nature and discusses the particulars of carbon credit trading which will give lead to further research. The paper also talks about various prospects and challenges of carbon credit trading in India.

Keywords: Carbon Credit, Carbon Credit Trading, Carbon Commodity Market, Emission Reduction.

Introduction

“We devote billions of rupees finding life on other planets, and trillions extinguishing ours.”

Climate consequence is a burning issue, one of today's most drenched environmental concerns. Numerous stakeholders like environment devotees, NGOs, scientific forums, and media, take a step to raise responsiveness about the progressively fading climate conditions even in rural areas. Having a universal effect on the everyday existence of the people. It spares none of the living organisms from its fury, which most often people discuss, to the various platforms. It is a gloomy observation to say that people and governments all over the world are only discussing it, but none of us took pains to grip the seriousness of this “difficult truth”.

From eras departed, the temperature of the Earth has been varying naturally, but in recent times the issue has been accredited by hominoid trepidation. In the words of “**Growth & Development**”, individuals are fluctuating the environment through various modes such as speedy industrialization, the momentous population growth. One of the most awful outcomes of these activities was increased emissions of greenhouse gases (GHGs), especially carbon dioxide due to the burning of fossil fuels as well as deforestation. Anthropogenic activities gave rise to gases like methane and nitrogen drain heat toward the earth thus causing global warming. In past years, the common opinion was perceived that haunting humans evoked global warming that cause a threat to life on the earth.

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Today, an emergent global consensus is that fighting environmental conditions is a prima challenge of the 21st century. A world's exposure to the extent of this consequence is substantially decided by the existence of a suitable and competent mitigation approach; one such mitigating alternative is the strategy of Carbon Credit Trading or the Emissions Trading Scheme, which is often known in European countries. The focus of this paper is basically on carbon trading.

Review of Literature

Bhanawat. S.S. & Yadav.N. (2021), "*Carbon Accounting Practices in Select European Companies Accounting Standards by ICAI*", In this research paper the study was conducted of 25 European Companies. The data was collected from the annual report of the company and analysis was done through content analysis. The result of the study was that Carbon trading practices in Europe are still working on an agreement on how to record carbon allowances in the financial statements. It also said that divergent accounting treatment of carbon emission allowances has been followed by sample companies of European Union countries. Among 25 companies studied 20 % showed it as an inventory, 32 % as intangible assets, 16 % showed both the intangible as well as inventory, and 4 % as other assets.

Arora.V. (2021), "*Carbon Credit Accounting in Indian Perspective*", (IJMRSET). The study was based on secondary data. The finding stated that since India comes under a non-annexure country so limit on emissions is not specified so they can get carbon credits by registering them in the CDM project. Where 1 unit of CER is equal to 1 metric ton of CO₂ or equivalent gases. Credits can be traded internationally at the current market price. The credit has been given recognition as "Intangible assets" and traded in the form of stocks.

Chonde. G.S. (2016), "*Use of carbon credits/trading for environmental protection: a review Environmental Sciences To find solutions to climate change in the world*" The study reveals that Carbon credit helped developing countries to start with clean and advanced technologies, 60- 70% of emission is through fuel ignition in industries such as cement, steel, and textile and Carbon Trading is in its emerging stage that requires time and effort to be groomed as one of the established markets.

Chopra. R. (2016). "*Assessment of Carbon Credit and Clean Development Mechanism in India*". International Journal of Applied Environmental Science. The objective of the research was to evaluate carbon credit and clean development mechanism projects in India. The research's fallouts show that the significance of India's liberal approach to the CDM project for sustainable development remains unclear. A statistical analysis of CDM project execution in India reveals that in India, CDM projects are concentrated in states that are more industrialized, such as Gujarat and Maharashtra.

Kumar.P. (2016). "*Carbon Credits: A Paradigm Shift Towards Money-Making Opportunity*". Optimization: Journal of Research in Management. the objective of the study was to examine how Carbon Credit emerged as a global phenomenon entailing serious and long-term strategic implications. The study suggests that India has got a great opportunity under the CDM project to create CER by way of limiting its carbon footprints. The study also discusses India's potential in generating wealth through Carbon credits.

Kaur.R (2016). "*Analyzing The Impact of Carbon Credit A Step Towards Sustainable Environment*". International Journal of Informative & Futuristic Research. The study was done of the 5 companies based on secondary data derived from the annual report. The study revealed that Canada has the maximum percentage change in CO₂ in 2011-12 and then in 2012-2015 the emission was continual. India reported an 11% change in the 1st year and the percentage declined. Whereas USA emissions declined by 2% for 2 years and then again increased by 2% for the year 2013-14. In Japan the 1st year the increase was 8% and it remain the same for the subsequent year. Australia has a stable growth decline of 2% and China 2011-12 it increased by 3 % then 2013-14 the % declined to 1 %. It was also found that companies that are taken for the study have generated revenue from carbon credits and if the carbon credits are not been used then it will affect the profitability of the company and the earnings of shareholders.

Objectives of the Study

- To know about carbon credit trading and the carbon market.
- To know the impact of carbon credit trading on economic sustainability.
- To know about the background of carbon trading.
- To analyze the prospects and challenges of the carbon market in India.

Research Methodology

The study is descriptive & qualitative where data has been collected from various websites, journals, articles, newspapers, reports, and published research papers.

Background of the Study

World's Achievement towards Climate Change – Timeline of the Events

Carbon credit trading is an imaginative arrangement designed to diminish carbon emissions and to boost the alleviate exertions of this obstructing climate devastation, was introduced as a response to the Kyoto Protocol in 1997. Before beginning with the introduction of this novel plan and delving into the specifics of how carbon markets function, I'd like to briefly outline the sequence of events that led to the Kyoto Protocol's convening and the subsequent adoption of carbon trading. This timeline will show how the international community responded to climate change.



Figure 1: Showing World's Achievement Towards Climate Change – Timeline of The Events

- **1988: IPCC was Established**

When the World Meteorological Organization (WMO) and United Nations Environmental Programme assembled a group of scientists to investigate the worldwide impact of climate change in 1988, the seriousness of climate change was acknowledged for the first time. As a result, the Intergovernmental Panel on Climate Change was founded. (IPCC). (Berliner, 2003). The major international forum for the evaluation and mapping of climate change is the IPCC, which has its headquarters in Geneva. It does not track climate-related variables or undertake research; instead, it evaluates the most recent scientific, technical, and socioeconomic data collected globally to better comprehend climate change. The World Medical Organization and the United Nations are both welcome to participate, and thousands of scientists freely give information to it.

The three working groups (WGs) of the IPCC are in charge of evaluating the report to the best of their abilities. The WG1 evaluates the scientific elements of the climate system and climate change, the WG2 evaluates the impacts, adaptation, and vulnerability associated with climate change, and the WG3 evaluates the options for reducing GHG emissions and other forms of climate change mitigation. The IPCC Executive Committee is made up of this in addition to a task force on national greenhouse gas inventories. Each working group releases an Assessment Report (AR) every few years; the most recent was Assessment Report 5, created by WG1, and published in September 2013. These findings are listed below. (Tangang, 2013)

- The sea level has risen, the amount of ice and snow has decreased, the atmosphere and ocean have warmed, and greenhouse gas concentrations have increased.
- It is obvious that humans have an impact on the climate system.
- If greenhouse gas emissions continue, the climate system as a whole will continue to warm and undergo changes.
- In comparison to 1850 to 1900, the global surface temperature is projected to shift by more than 1.5°C by the end of the twenty-first century.
- Substantial and ongoing reductions in greenhouse gas emissions are necessary to combat climate change.

- **1992: Brazil Hosts the Earth Summit**

The United Nations Framework Convention on Climate Change (UNFCCC), an international treaty aimed at stabilizing GHG concentrations in the atmosphere to a level that would prevent "dangerous anthropogenic interference," was established as a result of a United Nations Summit that took place in Rio de Janeiro, Brazil, in 1992. The summit is also known as the Rio summit. All of the participating countries agreed that this level should be attained within a geological time frame that would let ecosystems to adjust to climate change naturally and so assure sustainable development. (Gautam Dutt, 2007).

Every year, the UNFCCC signatories get together to debate their climate change plans. The Conference of Parties (COP), which convenes yearly, is the UNFCCC's top decision-making body. One significant agreement was obtained at the third COP, which was convened in 1997 in Kyoto, Japan, and gave rise to the infamous Kyoto Protocol.

- **1997: The Kyoto Protocol**

A global agreement to reduce greenhouse gas emissions is known as the Kyoto Protocol. Even though it was signed in 1997, it didn't go into effect until 2005. The countries were classified into three categories according to their level of development, and each was given shared but unique duties for reducing emissions. Six GHGs whose emissions must be restricted are listed in Annex A. These include sulfur hexafluoride, hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), methane, nitrous oxide, and carbon dioxide.

As a result, the first commitment period, which runs from 2008 to 2012, places a target on the Annex I countries, the majority of which are first-world nations like the United States, France, and Japan, to reduce GHG emissions by at least 5.2 percent as compared to 1990 levels. (Gautam Dutt, 2007) A subset of Annex I countries made up Annex II countries, which were obligated to provide developing nations with financial help and technological know-how. The Non-Annex countries, which include developing nations like India, Brazil, and China, do not have strict binding targets but are urged to achieve voluntary reductions.

The majority of nations ratified the Kyoto Protocol; the US, one of the biggest producers of GHGs, was the exception. The US argued that agreeing to a reduction in emissions would significantly slow down its rate of development. As the US remained steadfast in its position from 2005, Canada became the first nation to leave the agreement in 2011, citing the convention's disadvantage of not covering the top emitters.

The issue of climate change is unrelated to the GHG emissions' country of origin. Even though the US and Western Europe account for about two-thirds of these emissions, some of the poorest nations in Asia and Africa are the most severely impacted. The poorest people in the world, who don't even contribute to environmental pollution like others do, frequently feel the brunt of rising temperatures, according to Kofi Annan, the former UN Secretary-General. He attributed this issue's existence to the absence of leadership coming from the countries that produce the most pollution. (Trehan B.K., 2011)

Thus, it became apparent that there must be a global response to the issue of global warming. The Kyoto Protocol provided three flexibility mechanisms to allow the Annex I countries to engage in mitigation actions outside of their national borders when it was found that emission reduction was more expensive in some countries than in their counterparts. These were Joint Implementation, Emissions Trading, and Clean Development Mechanism (CDM).

The CDM includes developing countries, whereas carbon trading and cooperative implementation are exclusively open to industrialized countries. These are the occasions that paved the way for the development of the revolutionary carbon trading mechanism, which will be covered in depth

during the course of this article. This essay will concentrate on carbon trading and how it can be used to combat climate change. Whether or not this plan is effective? If so, who stands to gain? Are emissions being significantly reduced or under control? Finally, if there are any flaws in the plan, criticism, and arguments to close them.

- **2015: Paris Agreement (COP 21)**

The Paris Agreement's objective: (i) to undertake efforts to keep the increase to 1.5 degrees Celsius and to keep the increase in the average global temperature this century to 2 degrees Celsius above pre-industrial levels. (ii) Create tools to aid and assist nations that are extremely susceptible to the negative effects of climate change. A prime example would be the threat posed by rising sea levels to nations like the Maldives. (iii) Confirms that by giving them financial and technological support, industrialized countries have a responsibility to assist underdeveloped countries. **Specifically, the agreement refers to 20/20/20 targets.** A 20% decrease in carbon dioxide emissions, a 20% increase in the market share of renewable energy and a 20% increase in energy efficiency is the goal.

- **2022: COP 26 at Glasgow – “Together for Our Planet”**

The annual Conference of the Parties (COP), according to the United Nations Framework Convention on Climate Change (UNFCCC), has two main goals: to evaluate how the Convention, Kyoto Protocol, and Paris Agreement have each been put into practice and must decide whether to develop and use these three devices further. For every COP, specific goals are also established. Four objectives that had to be accomplished before COP26 were outlined. These included:

- Achieve worldwide net zero by the middle of the century and limit warming to 1.5 C by: increasing the transition to electric vehicles, reducing deforestation, hastening the phase-out of coal, and supporting investment in renewable energy.
- Adapt to save local populations and ecological systems.
- Raise an annual minimum of \$100 billion in climate money.
- Collaborate to accomplish your goals, including completing the Paris Rulebook and stepping up the fight against climate disaster.

- **India's Standards based on COP 26**

At the Conference of the Parties (COP26) to the United Nations Framework Convention on Climate Change (UNFCCC), which was held in Glasgow, United Kingdom, the Government of India outlined and represented the concerns of developing nations. Additionally, India proposed the subsequent five major components (Panchamrit) of India's climate action: The capacity of non-fossil energy should be 500 GW by 2030, By 2030 it will source half of its energy needs from renewable sources, global carbon emissions are expected to be reduced by 1 billion tonnes and a 45% drop in the economy's carbon intensity from 2005 levels. By 20270 reducing carbon emissions to Net-Zero.

Carbon Credit Trading

Carbon Credit Trading is described as a "market-based approach used to control pollution by providing economic incentives for achieving reductions in the emissions of various pollutants." (Emissions Trading, 2015) According to the Kyoto Protocol, Annex I nations may participate in an emissions trading scheme in order to meet the emission objectives assigned to them if they believe their GHG emissions will rise or stay the same. In accordance with the Clean Development Mechanism, non-annex countries, and developing nations can obtain a certificate known as the Certified Emissions Reduction by implementing energy-efficient technologies that reduce emissions. (CER).

The developing nation can then sell these CERs for a predetermined price to any developed nation or corporation in the first world that has an emission target to satisfy. Therefore, rich nations can fulfill their emission targets by purchasing these CERs for cash instead of reducing their emissions, which will assist in stabilise GHG emissions.

Each nation that has ratified the carbon treaty receives a certain number of carbon unit quotas from the UN. The amount of emissions is constrained by these units. Some nations have had such great success cutting their emissions that they no longer need all the carbon allowances they have been given. However, other nations might find it difficult to reduce their emissions, necessitating the need of more credits in order to efficiently carry out their manufacturing.

Countries may then turn to the purchasing and selling of these tradable carbon units. Depending on how many of these carbon units are in use, the price will vary. Prices for carbon units fluctuate in

response to supply and demand, just like on a stock exchange. The choice of how to reduce emissions rests solely with each nation. A significant portion of a nation's carbon emissions are frequently attributed to heavy industry. Because of this, many nations have agreed that these businesses must contribute the most to reducing emissions, but everything is relative.

In other terms, carbon trading is the act of purchasing and selling quotas (permissible emission limits) that permit the holder of the quota to emit the equivalent of one tonne of carbon dioxide. As a result, if a company's or a nation's emissions are less than its allotment, it can sell its excess on the carbon market. In contrast, if it goes above the allotted amounts, it will need to either acquire more quota or reduce its output. Since the ETS usually aims to reduce emissions of carbon in particular, it is commonly referred to as carbon trading.

This Example will Further Explain how the Carbon Trading System Functions

Take two enterprises A and B, for instance, to which the higher authorities have given carbon units to. Imagine that factory A decides to cut its emissions by implementing climate-friendly practices. Because of how well its efforts to reduce emissions have worked out, at the conclusion of the production cycle, they actually have carbon units to spare. On the carbon market, these spare parts are now available for trading. The opposite is true for Factory B, which is compelled to purchase carbon units from Factory A since it is unable to lower its emissions. Although factory C, which is situated in a developing nation, can reduce carbon dioxide, plant B can also cover its emissions by doing so. Despite not being subject to any obligations under the Kyoto Protocol, this nation's emission reductions in factory C will nevertheless be acknowledged by the UN, and factory B will get carbon units equal to the reduction made possible by factory C. Therefore, low emissions are produced, a step towards a cleaner, greener environment, regardless of whether factory B purchases carbon units from factory A or factory C. In technical terms, there are two types of carbon trading: cap and trade and offset.

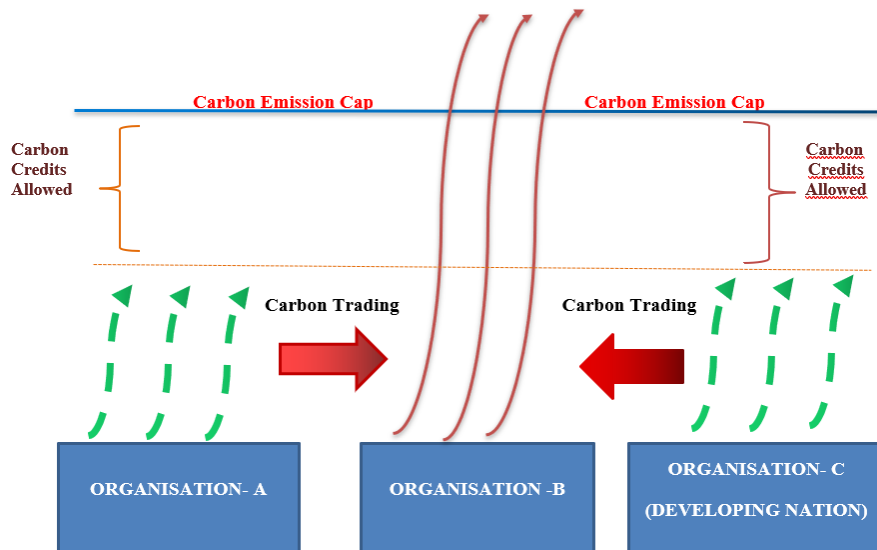


Figure 2: Showing Illustration of Carbon Credit Trading

Cap and Trade

A government or intergovernmental organisation establishes a cap or overall legal limit on emissions for a given time period and issues a predetermined number of licences or quotas for releasing the emissions. The polluting party must own adequate licenses to cover its emissions. As was already indicated, if a polluter doesn't use all of its licenses, it can swap them with another polluter who has used all of its permits and needs more to keep emitting within the law. The large industrial producers of the six greenhouse gases are the ones now subject to caps in the case of carbon trading: The United States and the European Union are the two most industrialised nations in the world, and although they are the top polluters, the US is not adhering to the cap because it did not ratify the Kyoto Protocol. In a carbon trading system, each permit is regarded as being equal to one tonne of carbon dioxide. Such permits assume that it is possible to estimate and convert the global warming potential of the other greenhouse

gases to a multiple of the value that was ascribed to carbon dioxide, which is one. It is frequently asserted that we must limit the rise in Earth's temperature to 2 degrees Celsius in order to protect our planet from the ultimate climate catastrophe.

An example of how cap and trade functions is provided below. Let's say that there are two parties: Japan and Australia. 100 units were allotted to Japan, while 200 units went to Australia. Australia, however, emits 210 units of GHG in a given year since the Australian Government is unable to keep this quota in place. However, the Japanese government takes very significant measures to restrict emissions, thus they only produce 90 units of GHG. Thus, it has ten carbon units in reserve. The 10 extra units are now available for purchase from Japan under the cap and trade system, allowing Australia to stay within its limit without incurring any sanctions or penalties.

Perform, Achieve, and Target (PAT) Scheme

In a three-year cycle, PAT assigns Specific Energy Consumption (SEC) reduction targets to a subset of notified energy-intensive units with threshold energy consumption. In July 2012, the Bureau of Energy Efficiency (BEE) introduced the Perform, Achieve and Trade Scheme (PAT Scheme). Making India's industrial sector energy-efficient is the program's main objective. For each industry, the programmed establishes energy efficiency goals, and those who don't meet their goals must pay a fine. Based on the target's remaining accomplishments, a penalty is assessed. The PAT program is under the BEE's National Mission for Enhanced Energy Efficiency. (NMEEE).

How Does the PAT System Work? The program assigns Designated Consumers (DCs) particular energy-saving goals for a three-year period. The targets are assigned based on the present energy efficiency levels of the DCs, with energy-efficient DCs receiving lower targets and less energy-efficient DCs receiving higher targets. A "gate-to-gate" methodology is used to determine the precise energy consumption, accounting for all energy use in relation to total production. To account for circumstances beyond the DC's control, the values are normalized. At the conclusion of the cycle, a group of experts called Accredited Energy Auditors, who are appointed by the BEE, evaluate the DC's performance.

Important Elements of the PAT Scheme: The PAT plan is a market-based method where energy-saving certificates are offered as rewards to enterprises that surpass their goals. In an energy exchange, these certificates may be traded. (Indian Energy Exchange or Power Exchange India). Other DCs that have not met their predetermined targets under the system may purchase the certificates. Units are responsible for paying the appropriate penalty if they fail to meet the targets through their own efforts or by purchasing energy-saving certificates.

Carbon Offsetting

Offsetting is the second type of carbon trading. Here, businesses, and occasionally international financial institutions, governments, and people, finance "emissions-saving projects" outside the capped area rather than reducing emissions at the source. As previously said, by lowering emissions elsewhere, these contribute to the company collecting CERs or credits to offset its own carbon emissions. One of the biggest such programmes is the Clean Development Mechanism (CDM), which is run by the UN. According to how much less greenhouse gas is thought to be entering the environment than would have otherwise been released in the absence of the initiative, the carbon "savings" are computed.

However, there is a complaint that offsets do not actually cut emissions, despite the fact that they are frequently promoted as such. Critics sometimes assert that, even in theory, they essentially translocate these reductions to the locations where emitting them is most economical. (Gilbertson Tamra, 2009) The claim that CDM is a deceptive strategy utilized by the rich world to shift accountability for lowering global emissions to poor nations has been made numerous times. Sunita Narayan, the director of the Centre for Science and Environment, said that this amounted to developed nations being forced to clean up the trash of wealthy nations for a fee. (Trehan B.K., 2011)

The following serves as an example of how CDM specifically and offsetting generally operate.

Let's use a coal-based power company in a developing nation as an example. assuming that one tonne of carbon dioxide is released into the atmosphere for every kilowatt hour (kwh) of energy produced. Let's now suppose that this power company constructs a wind farm. Therefore, carbon emissions are reduced by 1 tonne when the following 1 kwh of electricity is produced by wind rather than coal.

One carbon credit is equal to one tonne of carbon dioxide that is decreased. This credit may be sold by the electricity firm to a nation that has emission objectives it needs to meet. The electricity company might not have been able to afford the wind power facility without the sale of the carbon credits.

For nations like Brazil, India, and China, CDM and other offset programs assist in reducing the cost of technology as well as in putting in place mitigating measures to reduce GHG emissions. There are numerous additional initiatives that qualify for earning carbon credits. These include initiatives that use solar energy, and ethanol as a fuel, promote reforestation, or use the 3Rs, or recycle, reduce, and reuse. Additionally, these projects have the option to sell their carbon credits in advance and put the money raised to use carrying out the project.

Delhi Metro Rail Corporation has received numerous rewards for its creative carbon emission reduction techniques in India as well as a significant number of CERs. Later on, while discussing carbon trading in the context of India, this will be covered.

Carbon Market

"The carbon market is expected to become the world's largest commodity market and is expected to become a trillion dollar industry very soon."
– The New York Times.

A carbon market is an exchange on which carbon credits are traded. Carbon markets can be classified as either regulatory or voluntary.

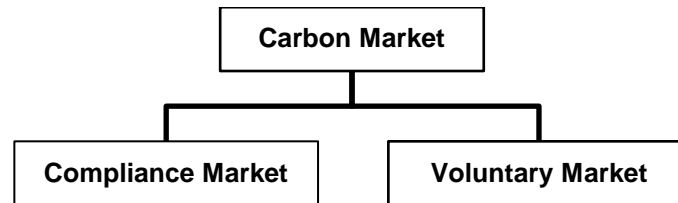


Figure 3: Showing Types of Carbon Market

As a result of the cap and trade program, the first kind reflects the compliance market. Emissions levels are predetermined and approved at the regional, national, or worldwide level. The market is used to negotiate the difference between the permitted emissions and those actually produced; a positive difference indicates a sale, a negative difference a buy.

The voluntary market is the second type, which is expanding somewhat faster. In contrast to the regulatory market, no set emission levels must be adhered to here. Instead, organisations or individuals choose to offset their emissions by making investments in greener, cleaner technology in other wealthy or developing nations, for instance, along the lines of the CDM. But because there are no set norms in voluntary markets, participants in these marketplaces lose trust. (Nussbaumer, 2007)

Carbon Market in India

India is quickly becoming a significant player on the international carbon market and a desirable location for holding CDM activities. Indian industry were able to profit from the sudden increase in demand in the developing carbon market, drawing a large number of buyers of carbon credits. Through the clean development mechanism, we have been one of the largest recipients of the projected 31 percent of the proceeds from the global carbon trade. The carbon market in India is one of the most rapidly expanding in the world and has already produced almost 30 million carbon credits, the second-highest volume of transactions worldwide. Even the biotechnology, computer technology, and BPO sectors in India are not rising as quickly as the carbon trading market. There are now over 850 projects with a total investment of Rs. 650,000 million. The Multi Commodity Exchange in India now also offers carbon for trading. This is Asia's first exchange for trading carbon credits. (Yatra, 2013)

Case Study based on Carbon Credit Trading in India

- **Delhi Metro Rail Corporation (DMRC)**

A significant portion of the city's population, estimated at about 18 lacks, has switched from using cars, buses, two- and three-wheelers, and other means of transportation that cause the emission of harmful and objectionable GHGs to using the Delhi Metro, a non-polluting, environmentally safe rail system. As a result, the DMRC has significantly reduced emissions, and the UN organization in charge of the CDM under the Kyoto Protocol has certified that the metro rail has earned carbon credits worth Rs. 47 crores per year for the following seven years as compensation for significantly reducing environmental

pollution; this amount is anticipated to rise as more passengers board. The finest clean development project prize was given to it in 2011 at the Urban Mobility Conference. The Model Shift Project, which made it the first metro rail and rail-based system in the world to be accredited by the UN and to acquire carbon credits to reduce GHG emissions, was the reason it received this honor. It was found that DMRC did its part to combat climate change by reducing pollutant levels by 6.3 lakh tonnes annually. The nationally recognized CDM project that Transforming trips taken on conventional modes of transportation to Metro trips is the goal of the CDM effort. By drastically reducing emissions per passenger kilometer in contrast to the condition prior to the project's operationalization, Delhi's Metro system is now more efficient at using resources to transport people. (DMRC, Delhi Metro Wins Award For Best Clean Development Mechanism Project, 2011)

For implementing greener operating procedures, the DMRC was honored for the second time. It previously featured a regenerative braking technology that reduced the system's overall energy use by roughly 30% by reducing the amount of electricity needed. It is stated in the press release by DMRC itself, which explains how regenerative braking operates, that under this system, "whenever trains on the Metro network apply brakes, three phase-traction motors installed on these trains act as generators to produce electrical energy that goes back into the Over Head Electricity (OHE) lines. Other accelerating trains in the same service line utilize the regenerated electrical energy that is returned to the OHE, resulting in overall energy savings. (DMRC, Delhi Metro Receives more than 2.4 Crores from the sale of Cer's, 2011)

Another accomplishment was that the Delhi Metro Corporation received a total of about Rs. 2.41 crore through the carbon credit program run by Japan Finance Carbon Ltd. thanks to the sale of 39000 CERs for the year 2008 and of 43000 CERs for 2009. In 2011, these payments were made. The money made was used to fund research and development aimed at creating more environmentally friendly technologies as well as to offset the revised operation expenses and additional investments made in light of the CDM project.

- **Jindal Vijaynagar Steel**

This specific steel mill started utilising Corex Furnace technology, which stops 15 million tonnes of carbon dioxide from entering the atmosphere. It has also stated that it will be prepared to offer \$225 million worth of earned CERs produced by its carbon safe technology in the upcoming years. (Yatra, 2013)

- **Powerguda in Andhra Pradesh**

This community in Andhra Pradesh started producing bio-diesel from 4500 trees belonging to the Pongamia family that were located nearby and has since claimed to have prevented the emissions of 147 million tonnes of carbon dioxide. The earned carbon credits will be sold by the company. (Yatra, 2013) We now have a wealth of factual evidence to back up the assertion that India has been moving towards greener technologies and, despite not being constrained by any emission targets, is making significant progress in reducing carbon emissions.

- **Indore Smart City Development Limited (ISCDL)**

For four straight years, Indore has been named India's cleanest city. Thus, ten months ago, the Indore Smart City Development Limited (ISCDL) registered three projects — a bio-methanation plant, a compost plant, and a 1.5 MW solar plant — under the Verified Carbon Standard (VCS) program of the United Nations Framework Convention on Climate Change (UNFCCC). More than 1.7 lakh tonnes of carbon dioxide emissions were lowered as a result of the registered projects. "One carbon credit is equivalent to one tonne of carbon dioxide. The gross income from these initiatives was paid at the rate of \$0.05 per tonne. The following steps were taken after registering the projects with the organization, the next step is to prepare the paperwork for submission.

After the EPA has confirmed the project's legitimacy and viability, certificates for carbon credits are issued. The certificates may then be exchanged on the global money market, speaking to The Better India. The IAS officer views the carbon credit trading scheme as a significant challenge and a fantastic learning opportunity. "There was no model for us to follow because Indore was the first to undertake this initiative in India. Since Indore is not a metropolis that is well-known to international customers, it was first challenging to persuade the buyers of the reliability," Additionally, the ISCDL was stepping into unknown territory by engaging directly with international organisations. "We sought out professionals and studied the carbon credit bidding procedure. After doing some research, we made the decision to place a bigger offer and divide the enormous quantity of carbon credits into smaller chunks in order to sell them to other markets.

The officer claims that after comparing prices with other vendors, the authorities discovered they were getting the best deal. Against predictions of less than 1%, "We earned returns of 1.5 percent of the total cost," Later, it was suggested that the revenue from carbon credits may be put in a project for a solar power plant, where the money would be used to fund additional smarter, greener, sustainable, and energy-efficient initiatives.

Prospects – Carbon Credit Trading in India

The advantages that India can obtain from the trade of carbon credits are highlighted by the following factors:

- **Trade with Industrialized Nations**

The US provides 30% of the world's emissions, whereas India just makes about 3%. As a result, India is reducing its emissions significantly and has a large market for selling credit certificates to wealthy nations who are going over their allowed limits more financial investors are drawn than firms.

- **Attracts more Monetary Investors than Businesses.**

It has been noted that this type of trade has attracted a lot of attention from investors in the financial sector for speculative purposes rather than from businesses to support their operational needs. It has provided yet another emerging and significant speculative market.

- **Potential for Establishing Corporate Carbon Funds**

"Carbon funds" may also be introduced, which will consist of carbon credits offered by numerous corporations, much to how mutual funds provide a portfolio of shares of various companies. This will probably draw more retail investors.

- **Increased Trade Exchanges**

"Carbon Credit Futures" were initially introduced in India by MCX in January 2008, then by NCDEX in April 2008. Numerous businesses own carbon credits, but this does not mean that ordinary investors are not involved in this market. They can engage in this market and profit from changes in the price of carbon. This sector will soon include banks and other associated entities.

- **No Set Standards for Reducing Emissions**

There are no set emission standards or caps in India. As a result, India will remain the source of carbon credits for a longer length of time than other Western nations. As a result, it will be able to attract more business from markets and nations throughout Europe.

CHALLENGES – CARBON CREDIT TRADING IN INDIA

- **More Participants in the Future**

Positively, it is anticipated that there would be an increase in the number of market participants, although this assumption is speculative due to the severe intricacy of this product and price sensitivity. Finding investors for carbon credits appears like a pipe dream because the foundational products, such as shares, mutual funds, etc., fail to draw in a sizable portion of retail investors.

- **Unbalanced Environment**

Uneven environmental conditions might result from this type of trading. By simply paying money for the right to harm the environment, firms that emit excessive levels of greenhouse gases can purchase more licenses to produce emissions.

- **Deviation from the Standard Procedure**

The main goal of the introduction of "carbon credits" was to promote an environmentally friendly mindset, make businesses aware of the extent of their own emissions, and assist them in reducing emissions. The carbon trade, on the other hand, seems to be luring more speculators than serious investors.

- **Heightened Pricing Sensitivity**

The price of carbon credits is significantly impacted by a number of variables, including: supply-demand imbalances, policy concerns, coal and crude oil prices, CO₂ emissions, European Union permits, foreign exchange fluctuations, and expansion of the world economy. This transaction is riskier than other investments due to these characteristics.

- **Unethical Conduct**

In order to get carbon credits, several industrial facilities in China have begun intentionally creating greenhouse gases. India is also expected to experience this predicament These elements make this trade riskier in comparison to other assets.

Critical Analysis

The carbon trading scheme was initially introduced with great vigour and was praised for its vision, but it has recently come under scrutiny and is being accused of being a multibillion dollar scheme built on the premise that polluters should pay to clean up the mess they caused rather than actually cleaning it.

Newspapers have frequently run headlines claiming that the plan will not actually help reduce carbon emissions since it will only reduce emissions from one location while allowing in emissions from another. According to The Guardian (26 May 2008), "Billions wasted on UN climate program," "Truth about Kyoto: huge profits, little carbon saved," and other examples, (The Guardian, 2 June 2007),

Many environmental and social justice campaigners have criticised carbon trading owing to its many inherent issues. It has been described as a very controversial policy with a bevy of flaws that skew the entire framework. These range from the use of financial instruments like CERs and carbon credits to a lack of reliable enforcement and verification methods. It has frequently been stated that trading in carbon essentially invents a new commodity. By sending a little amount of money to the poorer brothers who are exempt from such objectives, created good and empowers the "big brothers" and grants them permission to pollute even while exceeding the established limitations. Leading emitters like the United States have not ratified the agreement as of yet. The IPCC has previously recommended that during the second commitment period of the Kyoto Protocol, which begins after 2012, a stricter evaluation of the project should be assured to provide "real carbon credits" and demand for reducing emissions at source. (Choudhury K.C., 2009).

Conclusion

Over the past ten years, a number of nations have implemented carbon trading systems to reduce indiscriminate GHG emissions. In order to minimize carbon emissions from industry operations, it has become an appealing choice to forgo costly new technology and invest instead in affordable and ecologically sound solutions in developing nations. The advocates of this plan have not been immune from attacks from climate change skeptics, even if the data to date shows that it has been successful in lowering emissions, as indicated above.

This trading method has had a mixed reception, which raises a fairly important point. "Are emissions trading programs a successful strategy for reducing climate change?" After carefully examining the information I gathered while researching and writing my term paper, I have come to the conclusion that cap-and-trade systems are more effective at decreasing emissions than many of its detractors would have you think. This is demonstrated by the fact that, between 2005 and 2007, the European Union Emission Trading Scheme was able to cut carbon dioxide emissions by an estimated 50–100 million tonnes. (Caney Simon, 2011) We noticed that DMRC has done some excellent work in lowering carbon emissions in the Indian setting as well, and its efforts have been recognized. To increase the effectiveness of this plan, some actions might be carried out alongside it. One of the easiest yet most efficient ways to reduce carbon emissions is through afforestation, which involves planting more and more trees. This is because forests operate as carbon sinks, absorbing all of the atmospheric carbon dioxide just as people do with oxygen. Additionally, a stronger push towards non-traditional or renewable energy sources, which has already been aided by the Clean Development Mechanism and the saleable CERs earned from it, will aid in reducing these toxic emissions far below the allowable limit, giving us access to pollution-free air to breathe and grow in.

Carbon trading is unquestionably a useful policy instrument to combat climate change if it is conducted properly and with the utmost care to avoid fraud of any type. Additionally, it is a morally admirable step towards achieving the low-carbon economy that will be necessary for humanity to survive and thrive on Earth for the foreseeable future.

As someone once said, "**The ecology needs to be preserved for the economy to flourish.**"

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