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Research Article

Carbon Market – A New Normal For Balancing Emissions

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ABSTRACT

In the 21st century the prime concern is to protect the environment and to build up a sustainable nation. Every anthropogenic activity affects our ecosystem that requires special attention worldwide. There are some anthropogenic activities which are equivalently important for human survival but the question arises how we can curb some of the activities which are affecting our planet. Montreal Protocol, Rio Summit, Kyoto Protocol, Paris agreement are some of the treaties signed by various countries where goals were set to protect the planet from any detrimental activities. Carbon market was originated from Kyoto Protocol which was signed by 192 countries on 11 December 1997. The paper gives an insight about the concept of carbon market, its different markets, growth in Asian region and the potential challenges to be faced by carbon market.

Keywords: Carbon market, Carbon trading, sustainable development, carbon offset, sustainability

Introduction

The increasing change in climate is an alarming problem and might hinder the development of economy. Climate change is the need of this 21st century which needs worldwide attention. Different anthropogenic activities had destructed nature and had resulted to global warming across world. Now it's time to bring a change or else it will create a serious problem for the entire mankind. Emission of carbon dioxide is a one of the important reason for the climate change. Green house gas emission, the carbon dioxide are the prime cause for climate change. Since industrial revolution significant quantities of green house gases were released till date and most importantly agriculture sector releases maximum GHG in most of the countries. The fifth assessment report of intergovernmental panel on climate change states that extreme weather on the planet has been increasing since 1950s and heavy rainfall, droughts, floods are occurring in a high level which are affecting the economic activities

Carbon market is a great initiative undertaken to reduce carbon emission and act as a tool by which a nation can earn by emitting carbon. The Kyoto Protocol in the year 1997 was the first time when international parties agreed to meet regarding carbon market but as two nations i.e. US and China not being present, the treaty of universal adoption came to halt. In the year 2015 there is a change seen when 196 parties at COP21 signed an agreement known as Paris agreement. This agreement is an international treaty with a goal of managing climate change and also to reduce global emission of carbon dioxide. And most importantly to make the countries accountable for actions related with carbon emissions. Companies are striving hard to make a change in the climatic condition by curbing carbon to a greater extend and many efforts have been taken by them to reduce green house gas emission but yet there are some companies who have found that they cannot eliminate emission fully or even reduce them as a result they will have to rely on carbon credit. Mckinsey Sustainability report (2021) made an estimation that the demand for carbon credit could increase to a 15 factor by the year of 2030 and it would also increase by a factor of 100 by the year of 2050.

Literature Review

Chanda, S., Malakar, A., & Gorain, S. (2021) made a study on world's carbon market and have accessed to what extend India has traded its carbon credit in World's Carbon Market. The study also tries to find out the GHG emission by burning agriculture residue and to measure it an econometric model was adopted. It has been found in the study that India has made an enormous amount of loss by burning crop residue which can be converted as a source of income. Burning of crop residue is considered as a menace not only for

agriculture but beyond it. Carbon credits are highly influenced by fluctuations of export of CO2, index of industrial production, greenex and price of gold, coal and power. It is suggested in that along financial interest, global carbon market need to address climate change.

Shen, N., Zhao, Y., & Deng, R. (2020) analyses carbon trading hinged on evolutionary perspective. The paper is based on reviewing literatures from 1998 to 2018 which were available on Web of Science database. It has been identified in the study that the first stage is all about designing of carbon trading schemes from1998-2006, second phase is based on carbon price issue which was for the period of 2007-2011 and 2012-2018. Carbon trading schemes has certain developments which includes four main aspects of disciplines. The four disciplines point towards mathematics. Carbon trading, carbon prices, market and supply chain are identifies in citation cluster and main three paths identified are "What affects carbon price?" and "What does carbon price affect?

Zhou, K., & Li, Y. (2019) discusses carbon finance and carbon market in China. It has been found in the study that financial institutions in China is trying to find out new innovations in carbon business system, its mechanism along with products in carbon market. The Carbon market in China is facing certain challenges which needs sound policies, knowledge about the system with proper rules and regulation system.

Shi, Y., Paramati, S. R., & Ren, X. (2019) working paper on growth of carbon market in Asia studies major Asian economies with special reference to Chinese carbon market. The author tries to find out the interrelation of carbon emission market between Shanghai and Shenzhen. It has been found that one way influence is from Shanghai carbon emission market on the Shenzhen carbon emission market. In both long run and short run the futures prices in the EU ETS market have a very negligible impact on the futures prices in both the Shanghai and Shenzhen. The result shed light for Chinese government to formulate policies for sustainable economic development. The carbon market also need international cooperation for reducing carbon emission target.

Paul, A. (2010) examines the concepts of carbon credit and carbon trading in India. It has been found in the study that with growing awareness of GHG emission among countries, the emission trading system also gain attention. India has a high potential of reducing GHG emission and trading in carbon market. The target of economic growth can be fulfilled by trading in carbon, but proper policies needs to be developed through which more GHG emission can be curbed and more carbon credits can be saved for trading.

Carbon Market – Global Perspective

Carbon trading is an economic inducement which motivates to reduce carbon dioxide emission. A central authority decides till what percentage carbon can be emitted and for that certain criteria has been set in form of cap or limit. The companies are allowed to emit carbon till the permit criteria and also required to hold the same number of credit which allow them to emit carbon. The term carbon market refers to a trading system where carbon credits are bought and sold. As per UND, "One tradable carbon credit is equivalent to one tonne of carbon dioxide."

There are broadly two different types of carbon market which are as follows

1.Compliance Market: Compliance market is a legal binding emission target which has been lay down by international, national and regional agreement, such as in Kyoto Protocol and Paris Agreement. The compliance market function on cap and trade plan which is commonly known as Emission trading system. Compliance market allows entities to buy carbon allowances if they exceed their budgeted carbon emission and also provides an option to sell carbon allowances if they emit carbon below its target.

2. Voluntary market: Voluntary carbon market exists along with compliance market which allows entities, non – profit organisation and individuals to purchase carbon credit on voluntary basis. It doesn't help a country in directly meeting its obligations based on Paris Agreement, but helps indirectly in curbing carbon emission at individual level. Voluntary carbon credit is quite cheaper as compared to carbon credit in compliance market. The factors which determine the price of carbon credit in voluntary market are based on project type, location, project size etc. It is a motivation for the companies who participate in voluntary carbon market. The companies strive hard to earn goodwill, but participating in voluntary carbon market is a right way to achieve it.

Growth of Carbon Market in the Asian countries

Carbon Pricing is an effective pricing technique in reducing the carbon emission or putting a price on green house gas emission. In the current time the reduction of green house gas has become a goal for the entire universe in order to achieve sustainable development. A collaborative effort has been made in Paris Agreement as a legal binding treaty on climate change. Till date 194 member countries have ratified into the agreement. Among the Asian countries, Korea is at the top most position as the country is self reliant on internationally competitive exports, and along with it the government of the country controls electricity prices which can be considered as a standard setter for the other countries whom to look upon. The core policy of emission trading system is look upon in Korea's 2030 GHG reduction and is considered as a roadmap in order to meet its nation's pre-determined contribution. The Korean system has a long term goal of curbing carbon emission as they go in a parallel way with the budgeted and national targets. In Korea they have also started auctioning for the credits which they earn through green house gas mitigation projects which is considered to be the best factors worldwide. China hand in hand with Korea has also gained

experience in emission trading system through its initial feasibility projects. And is also trying its hard in launching a national system specifically in the power sector. Cap setting is done through respective regulatory bodies in China. Though they are currently using flexible cap setting, they have an intention to set up fixed and standard cap in the upcoming time to full fill their target to reduce GHG emission and also to take part in carbon trading. Japan has two sub national emission trading system in Tokyo and Saitama which basically covers large factories heat suppliers, large plants etc. Taiwan has also developed emission trading system for over the last five years keeping a policy of comply with the future budgeted carbon. India being a part of Asian countries is also actively participating in the reduction of carbon emission as it had taken several initiatives. Government of India has passed an amendment on the energy conservation Act 2022 which leads to the establishment of carbon credit market in India. The market was set up with objective of making people aware about reducing carbon emission as well as making it a profitable and responsible source which will drive industries and general people to work together on sustainable growth. In the Indian carbon market, if the entities want to trade then they need to get themselves registered as "Registered Entities" for trading carbon credit. The central government authority has the right to issue carbon credit certificate. This market is not only limited to entities but also give an access to the general public to buy carbon credit voluntarily.

Functionality of Carbon Market – Challenges

1. Firstly the main concern is about the effectiveness of carbon market in minimizing the carbon emission as most of the companies are simply buying the carbon credit as it is quite cheaper rather than making an effort to minimize the carbon emission as it will be requiring a huge investment to install such technologies for curbing emission. So, the only way to make the companies liable for reducing carbon emission is by charging carbon credit at a higher price which makes them accountable for a sustainable development.
2. Secondly as per environment experts it is said that only quality carbon offsets are useful in curbing carbon emission. But, in the carbon market low quality credits are available which are unable to suffice the criteria. And moreover some actions such as forestation actions to reduce carbon emission are temporary only for the sake of buying credit and after which again deforestation takes place.
3. There is a surplus of carbon credit especially in voluntary market as compared to compliance market which means the sellers are comparatively higher as compared to the buyers of credit. And if this remains the same then the price of carbon credit will decline as we all know that if supply is more than the demand than the emitters will continue for high emission as there won't be any monetary driving force to act accordingly for reduction of greenhouse gas.
4. The rich countries are at position where they can easily buy credits at a cheaper rate as compared to developing countries by neglecting the main objective of curbing emission.
5. There is a need of regulatory body in the carbon market for trading of carbon credit and for the proper functioning there has to be an integrated institution which can manage the trading activities and which will also allow for smooth functioning.
6. Another challenge which is faced in carbon market is that most of the companies falsely market their green quality products so as to achieve credit points through which they can make out money and can be a part of green marketing for achieving sustainable development.

Carbon Market – Indian Purview

A significant step towards a domestic carbon market was made as a result of the recent draft on Carbon Credit Trading Scheme (CCTS) released as an agenda of the Energy Conservation (Amendment) Bill 2022 with the aim to mitigate fossil fuel consumption and encouraging the use of alternatives such as – green ammonia, green hydrogen, biomass etc. With the rapidly growing population and their ever increasing fuel consumption, a carbon market has become paramount for the Indian economy in order to maintain long run sustainability. India's carbon market is estimated roughly at $1.2 billion.[1] Of late, an active domestic framework has been flourishing in India for carbon trading. India currently operates two market-based emission reduction schemes: the Perform, Achieve and Trade (PAT) scheme and the Renewable Energy Certificates (REC) system[2].

The target areas for the PAT scheme are energy intensive industries such as – cement, aluminium, fertilizer, paper and pulp, iron and steel, railways, thermal power etc. The Specific Energy Consumption (SEC) are energy reduction goals under this scheme, set by the government aimed at companies in particular sectors.

The mechanism behind the PAT scheme is that where a company consumes less energy per unit of production than the standard consumption targets then they are rewarded with certificates known as ESCerts for saving energy which can be traded on Power exchanges and it can also be purchased by other participating companies in fulfilling their compliance needs.

The other scheme i.e. REC system is operating under the Renewable Purchase Obligation. The mechanism behind this scheme is that it allows the electricity generators to produce a certain percentage of their total

[1] HUSSAIN, ZOYA ADA. "How Do Carbon Markets Work?: IDR." *India Development Review*, 8 Feb. 2024, idronline.org/article/climate-emergency/how-do-carbon-markets-work/.

[2] What are Carbon Markets?, https://india.mongabay.com/2023/12/explainer-what-are-carbon-markets/

power from renewable sources like solar and wind, etc. These certificates can be traded and are intended to promote the use of renewable energy sources.
At present, the Indian carbon market is not fully regulated by the government. India is operating a voluntary carbon market which is not regulated by the government where instead the private entities plays the major role. The voluntary market provides a platform for the institutions, organisations and individuals to compensate their greenhouse gas emissions by acquiring carbon credits from brokers or project developers. In 2022, three project developers from India were listed among the top 15 worldwide in terms of carbon credit generation. To date, Indian organisations have garnered approximately $652 million in revenue from the sale of carbon credits utilised for offsetting emissions[3].
In order to establish a full-fledged compliance carbon market in India, the World Bank has approved $1.5 billion with the aim of boosting hydrogen production and scaling up renewable energy capacity of the country.

India's pathway towards decarbonising

As the country strides towards a more greener tomorrow, it has become paramount to control the fossil fuel consumption and harmful emissions by the industries. Carbon trading is believed to be one of the most powerful tool in reducing carbon emissions. The bigger firms are engaging in carbon trading as a part of their Corporate Social Responsibility (CSR) initiatives.
Carbon pricing has been recognised as one of the most viable solution in controlling carbon footprints by the developed countries. Being a developing country, India certainly has to encounter major challenges in its path towards sustainability. The two most important hurdles are insufficient capacity for designing and implementing the necessary instruments for carbon pricing, and the social implications of adopting them.[4]
The goal of India's carbon market is to improve energy efficiency while continuing economic expansion by reducing emissions per unit of output produced. Undeniably, India's total energy consumption will hardly decrease as various developmental activities are still on the map for the country. At present, India only aims to reduce the overall emission intensity by 2030. While keeping aside the main objectives of an established carbon market, i.e. ensuring cleaner source of energy, attracting investments, managing transitions and adopting energy efficient technologies, being an emerging economy, India prioritises achieving energy efficiency while simultaneously progressing its various developmental agendas.
The various challenges identified in the roadmap of India's goal towards decarbonisation are:

• Existing Infrastructure and Capacity

For a strong functioning carbon market, global support and cooperation is imperative which will aid in international finance and technology transfer thus leading to transition. India's existing energy infrastructure only accommodates solar and wind energy, the country is yet to tap other sectors such as – green hydrogen, solar thermal etc which are relatively under resourced. It has been observed that the existing storage capacity for renewable energy is also under resourced in the country. The Ministry of Environment, Forest and Climate Change notified a list of technological capacities which needs to be developed in line with the Article 6.2 of the Paris Agreement for trading carbon credits in the global carbon market.

• Dependency

The country's solar infrastructure is greatly dependent on imports. Polysilicon which is the crucial raw material for manufacturing solar cells has no domestic production. The National Programme on High Efficiency Solar Photo Voltaic (PV) Modules 2021 under the Production Linked Incentive Scheme has assigned 14 manufacturers for producing solar modules domestically by entering into agreement with global players. This very move is believed to plunge the carbon market in India thereby promoting and developing in house manufacturing driven supply chain.

• Accountability and Transparency

Transparency and accountability are of utmost importance for an effective and efficient carbon market mechanism in the country. Due to regional disparity and unequal income distribution, effective monitoring of carbon credits may become difficult. There may arise issues in transparency and accountability as till now there is no central regulatory body for monitoring the carbon market in India. As such a national regulatory body will be necessary in the near future as and when a full-fledged carbon market starts functioning in the country.

• Environmental consciousness –

The culturally diverse population of India sometimes poses hurdle in safeguarding the environment and its surrounding. India being a developing country there is evident difference in the standard of living, level of thinking, literacy level of the people. As such it has been seen that, a class of the society still lags behind in

[3] What are Carbon Markets?, https://india.mongabay.com/2023/12/explainer-what-are-carbon-markets/

[4] Jaspal M and Mukherjee M, Charting Pathways for India's carbon market, https://www.orfonline.org/research/charting-pathways-for-india-s-carbon-market

showing timely environmental consciousness. There is a strong need to develop a feeling of belongingness towards the environment among the general public. For instance, individuals can plant a tree on regular basis and sell their carbon offsets to the firms which in turn use those offsets to balance their carbon emissions.

Conclusion

The possible ways to decarbonise the world which will help in controlling global warming and climate change has prompted more arguments than action of which the introduction of a well-structured carbon market for carbon trading can be a more viable solution.

With the rapidly growing economy, India has certainly imprinted its footprints on the global map with regard to economic integration, global sustainability, better infrastructure etc. But with a population of 1.4 billion, it has become a need of the hour to develop an energy efficient economy in order to achieve sustainability in the long run. Carbon emissions by the major industries has certainly become a threat for the ecosystem posing health hazards as well as the natural habitat is depleting day by day. The industries are constantly emitting harmful substances without thinking about the environment and the surroundings. It has thus led to an alarming situation giving rise to global warming, posing health hazards to the people, depletion of the resources and thereby resulting in the degradation of the ecosystem. Carbon markets are a beneficial solution for reducing carbon emissions which will have a multi-dimensional advantage for its various stakeholders. A full-fledged government regulated domestic carbon market in India will help the country in achieving energy efficiency backed by innovation, sustainability and resource mobilisation and optimisation. Carbon trading also aids in revenue generation for a country. As the voluntary carbon market in India grows exponentially, carbon credits which are used to offset emissions can become a major source of revenue for the country by selling them in the global market. Indian entities have already earned about $652 million from carbon credits used to offset emissions.[5] As such, India's carbon market is very much lucrative is believed to grow at a faster pace as result of the companies goal to attain net zero emissions in quick response to the crisis of climate change.

The global carbon market is expected to have a substantial growth by the year 2030 from $50 to $190 billon so we can say it is a both profitable and environment friendly mechanism which is available for both entities and individuals. It is also expected that by the end of 2030 the demand for carbon offsets and removal of carbons will be at its spike. It is forecasted that at some point in future the carbon market will act as a transition from a carbon offset market to a carbon removal market. So it can be concluded that carbon market is the one of the most potential future market through which a nation can reduce its GHG emissions as well as it can motivate both entities and individuals to protect the environment and earn through going towards sustainability.

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