10 Carbon Funding: A Step to Ensure Carbon Neutral Development in India & World

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Abstract

21st century is considered as the century of opportunities. The world is developing massively at all fronts especially economic. Nations are adopting a holistic model of multipolar world ensuring barrier free flow of relations being it economic, social, infrastructural, cultural or environmental. Nations across the globe, ensuring their economic growth, focusing on increasing manufacturing and industrial activities all across the globe, Thanks to the globalisation. Increment in manufacturing activities certainly brings hardships to this beautiful mother earth in terms of fascinating carbon emission. Higher carbon emission is considered as one of the prime causes for changing climatic scenario increasing mean average temperature of the planet. This results into most fatal natural calamities which causes severe damage to life and economic welfare of the nations. The concept of Carbon Funding was introduced to offset this challenge globally. This article explains the concept of carbon funding, its characteristics, its components, effectiveness of carbon funding in ensuring carbon neutral development, efforts made by national as well as international players for its implementations etc. This articles also reviews the working of various carbon funds and credit mechanism established under various international institutions.

Keywords: Carbon Funding, Climate Change, Carbon Funds and Credit Mechanism, Carbon Neutral Development, Globalisation.

Introduction

The world is becoming global village by following the principle of *"वसुधैवकुटुम्बकं"* which literary means *the world is a family*. This principle aligns global community with the essence of co-operation, unity, brotherhood, collectivism and harmony in every sphere of life. It can be Social, Cultural, Economic, Environmental and Technological as well.

The new world order makes country to go beyond boundaries considering the opportunities of globalisation. The process which ensures the free and convenient flow of trade, service, social values & customs and technology is considered as Globalisation.

Increasing pace of globalisation made it possible for the economies to rise beyond horizon and achieve marvellous social as well as economic development. The process ensures the improvement of standard of living, literacy, life expectancy, socio-cultural development of citizens of both developed as well as developing economies. It brings new opportunities for the advancement in each and every aspect of life. Also, technological advancement has been proved boon for 21st century bringing more comfort and facilities in lives of modern human. According to World Bank's *Digital Progress and Trends Report, 2023*, 66% of total global population has clear access to internet either through broadband or mobile connectivity generating handsome revenues of USD 59,37,579 million providing employment to 6,77,51,000 people globally in Information and Communication Technology (ICT) related manufacturing and servicings[1].

Above developments are truly beneficial for human existence on planet. Interestingly, the principle, what is good for one is, at same, evil for others, follows here. Our unconscious (in terms of environment) and non-futuristic advancement generates significant harm to our planet earth and puts a question on sustainability of our future generations. The biggest challenge we possess in the era of fourth Industrial Revolution, the biggest challenge our mother Earth facing, the biggest question of our century having is, none other than, Climate Change.

Climate Change: Modern Challenge of Modern Century

Climate is, usually, a term referred in context of weather of any particular geographical region. Hence, any variation observed in weather of any geographical region is considered as climate change. This process of climatic change affects various systems operationalised on our planet. Variations in the systems like Atmosphere, Hydrosphere, Cryosphere, Biosphere and Land surfaces collectively contributes to fascinating events on our planet. Increment in the ratio of cyclones, rising mean sea temperature, wild fires, melting of glacial ice along with increasing area under desertification generates significant biological as well as economical loss to wildlife and human[2].

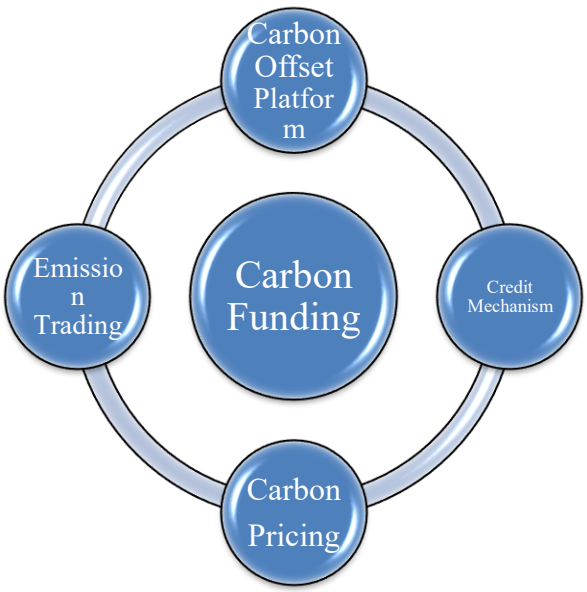
The world, on the contrary side, developing with gigantic pace towards economic, social, cultural, political developments. Interestingly, economic interests of the world economies bring them much closer now, then ever before. Each and every segment of economy including Agriculture, Industry and Service sector are developing with revolutionary pace. Also, *Emerging and Developing Economies (EMDEs)* contributes 45% of global GDP in 2025. Forecasting said that world economy will going to observe the growth rate of 2.7% in 2025-26[3]. This fact proves fascinating, if we consider, in terms of economic development at global level, but, as we all know, each coin has two sides and each transaction has some opportunity cost, here, we have our whole planet at cost. Increasing industrial activities, using non-renewable resources for energy, non-climate friendly practices followed in agriculture, excessive use of vehicles emits considerable amount of carbon in atmosphere. Due to this carbon emission, the world has started observing deviations in climatic systems, resulting in being *the modern challenge for the modern century i.e. Climate Change*. It puts questions on the table that, what can be done to minimise the impact of climate change? Should we compromise economic development for the sake of climate change? Should we stop using such practices which adds carbon in atmosphere? Do we have any alternatives?

The answer is obvious, we have alternatives, we always have solutions to any problem. That solution is Carbon Funding.

What is Carbon Funding?

Increasing manufacturing facilities across the planet is renowned as one of the prime carbon emitting activities along with vehicular and household emissions. Notably, Carbon is a common element in carbon dioxide (CO_2), methane (CH_4) and fluorocarbons which remains the prime gases in Green House Gases (GHGs) list. Increment in mean average temperature of the earth is the resultant process of increasing GHGs effect, which in turn generates climatic disbalance. Hence it is very vital to cut the emission of most important element of GHGs i.e. carbon. Surprisingly, cutting the carbon emission needs drastic deindustrialisation or limiting use of household and vehicular activities. This might lead to horrible reversal in global economic growth whose acceptance is neither welcomed nor feasible for nations. The question is what can be done to solve this issue?

Carbon funding, a concept which provides an excellent solution to most complex question of the century. According to United Nations Framework Convention on Climate Change's (UNFCCC) article 6.8 to the Paris Agreement, climate funding is a way to finance climate change action by putting pricing element to climate action. Carbon funding is one such approach which finances recreational facilities that sinks the exact of amount carbon which equals to the amount of carbon emitted in the atmosphere. It is widely accepted as a finest solution that can mitigate the adverse effect of climate change. Also, as signatory parties to the Paris Agreement committed to limit increment in the mean average temperature of planet below 2 Degree Celsius by the end of 21st century. This commitment needs serious efforts in curbing carbon emission in the atmosphere. Carbon funding can play a crucial role in backing this commitment by adopting carbon pricing mechanism, carbon credit certificates along with carbon offset mechanism[4].



Terminologies associated with Carbon Funding

- **Carbon Offset Platform**

Carbon offset platform is a kind of e-commerce platform where an organisation and an individual and companies can offset and contribute the finance in exact amount of carbon dioxide emitted by them. This platform also provides carbon emission calculator which calculates the carbon emitted by individual on the basis of their household, transport and food related consumption. The amount of carbon emitted provides numerous infrastructure project where an individual or companies can invest the amount satisfying their carbon emission throughout the year[5]. Following are the numbers of project available for investment as a part of carbon offset mechanism:

  - Asia- 51 Projects (India- 25 projects)
  - Latin America and Caribbean- 11 Projects
  - Africa- 5 projects

- **Credit Mechanism**

Article 6 of The Paris Agreement provides Carbon Credit Mechanism. Under this, a country can use their green practices to reduce carbon emission and creates a significant amount of carbon credit. This carbon credit can be transferred to another nation which can utilise this credit to meet their *Nationally Determined Contribution (NDCs)* targets. Paris Credit Mechanism ensures climate co-operation amongst the member countries and encourages to achieve Net-Zero Emission approach.

- **Carbon Pricing**

Carbon pricing is a mechanism which imposes the fees on those producers who emits GHGs and incentivise those who adopts climate friendly measures in their production activity. This concept shifts the burden of payment and emission both from public to GHGs producers. It also facilitates and promotes investment diversification from traditional non-renewable resources users to renewable and clean energy resources users. According to UNFCCC, this concept encourages producers to pay high charges for carbon emission or simply adopts clean and green production facilities. Also, *Article 6.2* of Paris Agreement allows for transborder carbon pricing mechanism which can facilitate carbon trading between two or more countries. *Article 6.5* of Paris Agreement envisioned to establish transparency and integrity in accounts of carbon pricing. Carbon pricing mechanism can be ensured by *Emission Trading System (ETS)* which seeks to provide a permit to the GHG emitters on reserving a unit of carbon credit for tonnes of GHG emitted by them. Carbon Pricing has a concept of *Carbon Tax* that can be imposed on users of fossil fuels for production. Interestingly, Carbon Pricing approach is one of the prime attractions for countries in fulfilling their *Nationally Determined Contributions (NDCs).* According to World Bank, implementation of Carbon Pricing mechanism can help countries achieve their NDCs through which cost of climate change can be reduced by 32% by 2030[6].

- **Emission Trading**

Article 17 of *Kyoto Protocol* provided the concept of emission trading by countries. Emission Trading mechanism allowed countries to spare their excess carbon credit units with themselves and not to sell that to those countries who are over their emission targets. This

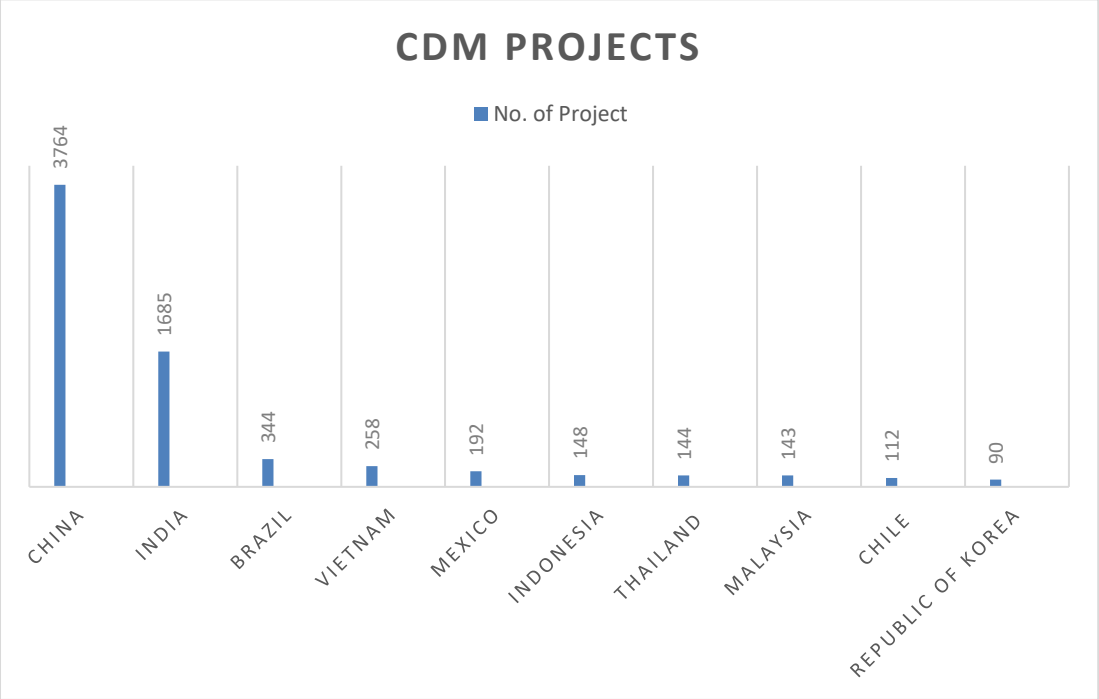
additional units can be sold to those countries who are lacking in their achievements. The *Emission Trading System* (ETS) is facility created under the guidance of Kyoto Protocol which regulates the trade of carbon credit. Since, carbon dioxide (CO_2) is the prime GHG, the market is often known as Carbon Market.

- **Clean Development Mechanism**

Kyoto Protocol, in the year 1992, has suggested the formulation of Clean Development Mechanism (CDM) with a vision to entrust the green and clean economic development growth across the world. CDM facilitates developed nations, who are using sustainably green production practices, to invest their reduction targets in emission reducing projects of developing nations. In return to this investment, projects in developed countries are provided with *Certified Emission Reductions (CERs)* which are tradable *"Carbon Credits"*. This carbon credits are traded in various carbon markets established by nations or group of nations or any multilateral institutions. Following are the steps through which any project can registered and get CER issuance:

- **Global Status on CDM:**

As on 31st December 2023, globally, 7842 projects are registered as CDM projects in various geographical regions of the world. Interestingly, majority of CDM projects, almost 4/5th, are based in Asia-Pacific region followed by Latin America and Caribbean, Africa and Economies in Transitions. 60% of this project belongs to large scale projects while 40% projects belong to small scale project. Though Asia-Pacific region observes the highest projects across the globe, dominance of two largest economies in the region, China and India, can be seen in the numbers. Developing countries like Vietnam, Indonesia, Thailand, Malaysia also emerges as a significant player in terms of CDM project base development. Brazil, Mexico and Chile remain the front runners in CDM projects. Among these regions following is the list of top ten nations having highest CDM projects[7]:



Source: Clean Development Mechanism (data as on 31st December, 2023)

- **Global Achievements of CDM Projects:**

United Nations Climate Change published a report on Achievements of Clean Development Mechanism from 2001-18. These achievements are as follows[8]:

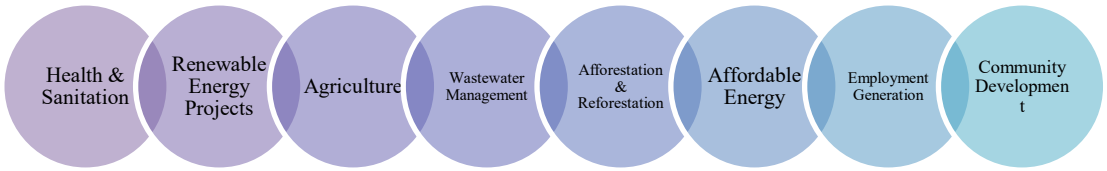
- Almost 2 billion tons of Carbon Dioxide equivalent (CO_2 e) reduced in the developing world.
- USD 303.8 billion invested in climate and sustainable development projects.
- 1 million cookstove installed which reduced the emission and health risk to households.
- 152 million trees planted across the globe.
- 8,40,000 people provided with clean drinking water facility.
- 40% of projects are linked with local community which enhances their livelihood, education and standard of living.
- 27% of projects produces financial benefits for local and regional economies.
- 1,00,000-gigawatt hours electricity generated from renewable energy resources.
- 25% of projects improves, protects and efficient uses natural resources.

- **Clean Development Mechanism in India:**

India, the fifth largest economy in 2025, not just hosts the CDM project but it also registered herself as the second largest CDM hosting party after China in Asia-Pacific region of United Nations Framework Convention on Climate Change (UNFCCC) and the world. India has framed National Action Plan on Climate Change (NAPCC), in the year 2008, to ratify her

commitment towards CDM and UNFCCC suggested Nationally Determined Contributions (NDCs). Also, to facilitate the management and regulation of CDM projects in India, she has established National Clean Development Mechanism Authority (NCDMA) in 2003 for according Host Country Approval (HCA) to projects[9].

India strives to be the global leader in clean and green economic growth. She opens her door of carbon funding in all the majority sectors and areas of national importance. Being the second largest CDM project hosting party, India has registered magnificent numbers of CERs, contributing to multidimensional economic sectors. Phase wise systematic development of projects can be encountered in following sectors in India:



Benefits of Carbon Funding Mechanism

Carbon Funding makes companies compensate their carbon emission to incentivises in developmental projects of developed and developing economies of the world. Companies can use the carbon credit mechanism for funding various infrastructure, agriculture, ecological, community projects. Also, it has been observed that carbon funding can work as an additional source of financing for various sustainably developing projects across the world. But this is not the only benefit of carbon funding. Its *benefits* lie way ahead to that just of finance. Following are benefits of carbon funding to various stakeholders[10]:

- **Benefits to Companies**
  - Carbon funding works as an alternative source of revenue for companies indulge in developmental projects.
  - Using carbon credits towards green and clean practices fetches good investment and financial resources in projects which promotes the parties to adopt advanced technology and innovative practices.
  - Carbon funding encourages entities to go beyond the boundaries and escalate the globalisation process in various industries.
  - Adoption of sustainable practices creates goodwill of company which ultimately helps them to attract good amount of investment for futuristic projects.
- **Benefits to Society**
  - Carbon funding provides greater advantage to society in terms of generating significant employment opportunities in countries, especially in third world economies.
  - It encourages citizens to adopt sustainable living patterns by adopting such products which follows green practices.

- It ensures resilience to communities against the adverse effects of climate change.
- Adoption of clean and green living patterns provides numerous health benefits to citizen who can live healthy and disorder free life.
- It provides robust opportunities for locals to marketize regional artifacts and traditional ornaments of their culture.
- Improvements in local and regional infrastructure facilitates ease of transportation for locals.

- **Benefits to Environment**
  - Carbon funding stabilises Green House Gases (GHGs) emission through various offset mechanisms.
  - Decarbonisation of atmosphere can be ensured by bridging maximum possible parties funding the projects.
  - Offsetting carbon emission will minimises the calamitic events throughout the planet.
  - Sustainability of Bio-diversity including fauna and flora, land based or sea-based, can be ensured.
  - Danger of extinction of various species can be mitigated.
  - Energy diversification and generating revenues through selling of excess of energy can be possible.
  - Air and noise pollution can be tackled by adopting sustainable practices aided with advanced technology.
  - Figures of various phenomena like increasing desertification, melting of glacial ices, unregulated weather patterns, numerous cyclonic disturbances can be reduced.
- **Benefits to the Government**
  - Governments can fulfil their commitment to Paris Agreement of limiting mean average temperature below 2 degrees Celsius by the end of 21st century.
  - Burden of financing projects of national importance can be reduced.
  - Nationally Determined Contribution (NDCs) can be achieved with global support.
  - Economic development can be ensured by securing balanced regional growth in the country across various industries.
  - Diversification of funding other than carbon funding can provide excellent opportunities to finance various social security schemes ensuring integral humanism approach.

Global Status of Carbon Funding

Considering the wide range of benefits achieved from carbon funding mechanism, various economies of the world, along with regional & multilateral organisations, has developed their own carbon funding platforms and market. Following are the examples of carbon funds and aligned practices established across the world:

Organisation/Country	Fund Established
World Bank Group	Community Development Carbon Fund
Asian Development Bank	Future Carbon Fund
Asian Development Bank	Asia-Pacific Carbon Fund
Switzerland	Postal Carbon Fund
World Bank Group	Spanish & Danish Carbon Fund
World Bank Group	Bio Carbon Fund
India	National Adaption Fund for Climate Change
United States of America	Greenhouse Gas Reduction Fund
United Kingdom	UK International Climate Fund
European Union	Innovation Fund
African Development Group	Climate Investment Funds
133 Developing Countries	Green Climate Fund

Carbon Funding Mechanism in India:

As a signatory party to Paris Agreement on Climate Change, India has been working with magnificent pace in curbing carbon emission. Simultaneously, ratifying Paris Agreement, India has framed Nationally Determined Contributions (NDCs) to limit the increasing mean average temperature of mother Earth below Two degree Celsius by the end of 21st century.Following are India's NDCs for the period up to 2030 (as submitted to UNFCCC in August 2022 by Government of India)[11]:

- To promote a healthy and sustainable lifestyle based on traditional values of conservation and moderation through a mass movement for 'LIFE'- 'Lifestyle for Environment' as a key to combat climate change.
- To adopt a climate friendly and a cleaner path for economic development.
- To reduce emission intensity of its Gross Domestic Product (GDP) by 33-35% (Updated to 45% as earlier target was achieved, before time, in October 2023)by 2030 from 2005 level.
- To achieve 40% (Updated to 50% as earlier target was achieved, before time, in October 2023) cumulative electric power installed capacity from non-fossil fuel-based energy resources by 2030 with the help of Green Climate Fund (GCF).
- To create an additional carbon sink of 2.5 to 3 billion tonnes of CO2equivalent through additional forest and tree cover by 2030.
- To mobilise domestic and new & additional funds from developed countries to implement the mitigation and adaption actions.
- To build capacities, create domestic framework and international architecture for quick diffusion of cutting-edge climate technology in India and for joint collaborative Research and Development for such future technologies.
- **Offset Mechanism**

Bureau of Energy Efficiency (BEE), Ministry of Power, Government of India has set up a dedicated offset mechanism which allows the non-obligated entities to apply for registration of their project for certification under Carbon Credit Certificate (CCC). This certificate will allow them to seek carbon credit in exchange of their carbon emission reduction or removal or

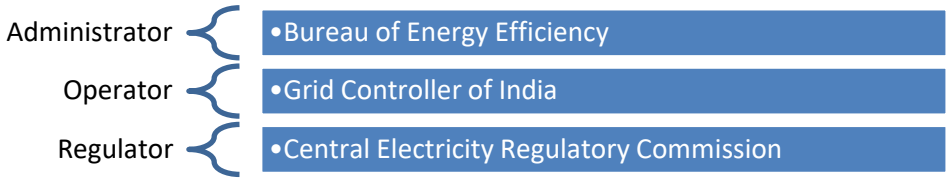
avoidance. Government has identified following sectors that can be developed in phased manner under this mechanism[12]:

Phase I	**Phase II**
Agriculture	Solvent Use
Forestry	Carbon capture, utilisation & storage of CO_2
Transport	Fugitive Emission
Industry	Construction
Waste handling and disposal	
Energy	

- **Carbon Credit Trading System (CCTS)**

With a view to be developed as clean and green economy, the government of India has developed national carbon credit electronic platform. This platform facilitates National Framework for Indian Carbon Market (ICM) which supports entities by assigning carbon credit in access for their exceptional work towards decarbonising Indian economy by adopting such practices which limits the Green House Gases (GHGs) emission in the atmosphere.

- **Institutional Framework in India**:



For the effective implementation of policies and bringing accuracy, central government has established National Steering Committee for Indian Carbon Market (NSCICM) under Caron Credit Trading Scheme (CCTS).

- **Perform, Achieve and Trade (PAT) Mechanism**

With a vision to fulfil its commitment towards Paris Agreement, India has set its own carbon market. The World Bank group has provided grant of USD 8 million, to India, for piloting and implementing its own carbon pricing mechanism to curb the Greenhouse Gases (GHGs)emission. India has utilised this fund in fostering her own carbon market assisted with Perform, Achieve and Trade (PAT) mechanism and Renewable Energy Certificates (RECs) scheme[13].

PAT scheme has been development and operationalised in five cycles within12 selected sectors. Following are the sectors covered in PAT Scheme:

Pulp & Paper	Aluminium	Chlor-alkali	Textiles
Thermal Power	Cement	Iron & Steel	DISCOMs
Railways	Fertilisers	Petrochemicals	Hotels

Carbon funding mechanism in India and its various tools is considered one step closer to achieve her ambitious Net Zero Carbon Emission targeted to achieve by the end of 2070. India's commitment towards achieving carbon neutrality can be ensured by following the principle of carbon justice and responsibility initiative[14].

Effectiveness of Carbon Funding in Achieving carbon neutrality in India

Carbon Funding, as a component of climate finance, proves combatant to minimise the effects of climate change.It has significant impact in achievement of carbon neutrality and induced reduction in carbon dioxide (CO_2) emission. Various funds established by multilateral organisation and countries plays vital role in mitigating carbon emission and encourages emitters to contribute through their carbon credits in sustainable projects, especially in third world economies.[15]

Commitment towards carbon neutrality can be ensured by establishing carbon industry system. The system will evaluate, regulate and extinct carbon emission from the atmosphere through trading mechanism.[16]Green investments, especially pulled through overseas investors and retail investors through the medium of capital market can help countries achieve their climate targets. Through offset mechanism, companies can invest towards achieving carbon neutrality and ensures sustainable development[17].

Mobilising green bonds to achieve carbon neutrality can help countries address the issue of financial crunch. Private debtors play crucial role in ensuring financial stability for developmental projects through their debt installation. Also, central bank's monetary policy and taxonomy systems plays assistant role in ensuring sufficiency of carbon funds[18].

According to United Nations Framework Convention onClimate Change (UNFCCC), finance and technology, in 21st century, are two major shields that can protect mother earth from climate challenge. Various tools like green bonds, green mortgage loans, green loans, green equity schemes play major roles as green finance tools to ensure carbon neutrality.Collectively, green investment, through public-private partnership, is crucial in fetching new and innovative technologies which encourages greener production practices, indirectly minimising carbon emission along with ensuring carbon neutrality[19].

Digital finance is emerging as new and modern tool for meeting carbon neutrality targets.Reducing use of paper and paperwork, through digital finance, encourages system to achieve carbon reduction with modern means and resources[20].

Challenges associated with Carbon Funding

Carbon funding is essential steps taken to mitigate carbon emission challenge. But as every coin has two sides, with benefits, it also has certain challenges. Carbon funding procedure and approval to projects takes longer duration in countries.Limitation in pace of approval is significantly lower than pace of increment in carbon emission.Also, adaption fund is used in diversified manner in which minimises its expected results[21]. Importantly, Design of

various climate fund requires long and detailed analytical study of each and every legal aspect along with acceptance and fulfilment criteria of projects. Fund governance, fund mobilisation and fund disbursement remain major constraints while establishing carbon funds[22].

Carbon funding concept requires huge investment that can finance projects for emission reduction. Private investors find it as more moral cause than profitable and hence are less interested in contributing towards emission reduction.Also, it requires advanced research and analysis in selecting target industries which costs more than returns. Hence, the burden of funding is majorly bearded by public sector investment which may compromise social security funds in pipeline[23].

Conclusion

Carbon Funding mechanism is more a need of hour than a mere concept. It can help in achieving Nationally Determined Contribution (NDCs) of global economies including India. This will directly help in overcoming the targets set by parties to the Paris Agreement. Modern technology along with efficient use of finance is most viable tool to apply for sustainable development. Also, Public-Private Partnership (PPP) model can be applied in ensuring carbon emission reduction which help to achieve carbon neutrality. India, being the front runner, plays a driving role in combating Greenhouse Gases (GHGs) by significantly fetching funds for her various community project thus by stepping forward to achieve Net Zero Carbon Emission goal by 2070. Though carbon funding presents a good theoretical framework for curbing carbon emission, its implementation is quite complex. Also, creation, allocation and disbursement of funds remains major time constraints for projects along with approval and issuance of credit certificates. It requires multinational co-operation, assisted by various multilateral institution, to establish sector specific funds. Awareness programs should be rolled out to attract citizens towards investment in small amount which can help developmental projects and ensure their active participation. Hence, carbon funding, when implemented effectively, can help in achieving carbon neutrality and save our good planet with drastic effects of climate change.

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