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– A REVIEW

CARBON CREDIT SCEINCE AND BUSINESS

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ABSTRACT

Today's world is facing a major problem, which makes a worst lane scenario in the present world. !!! We are talking about the pollution hindering the environment, we are living in so far our worlds various organizations made various aspects to control the pollution. In this new era, we have the "Carbon Credit" i. e the whole world is right new following it and making itself to adapt it. So now, we are out to make awareness about carbon credit among the all section of people.

Key words: Carbon credit, Greenhouse gases.

INTRODUCTION

Carbon Credit is a child brain of Kyoto protocol, which is introduced by United Nation Framework Convention on Climate Change (UNFCCC, 1997). Carbon credit is considered as the emission of the one tone carbon dioxide or equivalent greenhouse gases (GHGs). It helps to reduce the emission CO_2 or equivalent GHGs, which increases the global warming. Through, this can control the global warming, it is not only the science; it is also the part of economics, which gives platform to world, to change global climate and business of carbon trading.

The backbone of the carbon credit is Clean Development Mechanism (CDM), which is running by developing countries has sign on Kyoto protocol. The CDM plans help to gain the credits in market and improve traditional technologies and manufacturing, which are ecofriendly. India is second large distributer of CDM in the world after the China.

Carbon Credit is applicable to changing the climate and maintain the environmental issues such as avoided the deforestation, agriculture, sanitation, renewable energy sources, improving green technologies and improving the economic condition of the developing nations.

India is a potential supplier of the CDM in future. India has 1/3 of CERs overall world, which is registered in UNFCCC. India will be going to earn the 4,000 corers by carbon credit.

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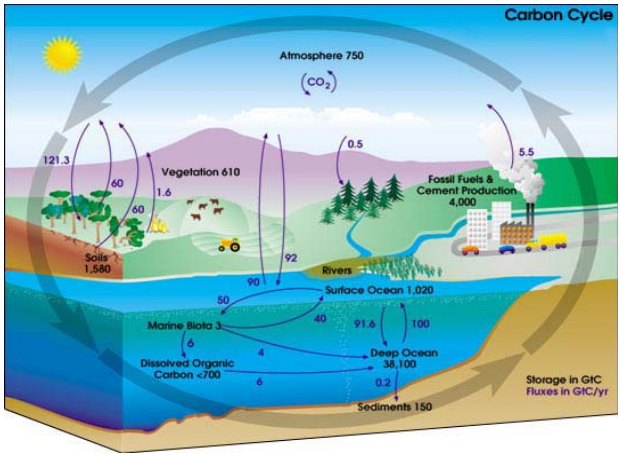

Fig. 1

Carbon credit

Many scientist and naturalist and well-established mainstream ecological foundation believe our world is being threatened by global warming and the effects of CO_2 emission and acceptance of this concept has become more widespread in recent year. These scientists believe that reduction in carbon concentration and greenhouse gas emissions are essential, if we are to minimize our impact on the environment. In 1997 the United Nation Convention Framework on Climate change (UNFCC) Introduce the concept of the "Kyoto-protocol" steal 187 nations has signed on the "Kyoto-protocol". The main aim of the Kyoto protocol is to reduce the emission of CO_2 and GHGs industrially developed countries (under 28 articles of protocol).

A permit that allows the holder to emit one ten of CO_2 or equivalence of the GHGs; credits are awarded to countries or groups that have reduces their GHGs below their emission quota. Its goal is to stop the increase of CO_2 emission. The Kyoto protocol presents nations with the challenges of reducing GHGs and storing more carbon. A nation that finds it hard to meet its target of reducing GHGs could pay another nation to reduce emission by an appropriate quantity. The carbon credit system was ratified in conjunction with the Kyoto protocol.

For example, if any industry plants enough trees or developed the technique to reduce the emission of one ten of CO_2, then it get credit or certain amount. Another industry emits 5 ton CO_2 as per emission quota, but it expecting more amount of emission then it purchase credit from first industry that's awarded the credit.

India had signed on "Kyoto protocol" in 2002 and on "Carbon credit" in 2005.

There are also many companies that sell carbon credit to commercial and individual customers, who are interested in lowering their carbon footprint on a voluntary basis. These carbon off setters purchases the exchange platform to trade, such as the carbon trade exchange, which is like a stoke exchange for carbon credit.

Carbon market and credits versus taxes

Carbon market

If a company has emission over its allowances, then this entails a cost. Conversely, companies able to stay under their allowances receive credit, which can be traded on exchanges. Additionally, companies creating projects, say in developing countries, which actively reduce GHGs emissions becomes eligible for

these carbon credit and then can raise funds, by selling them, perhaps to a company exceeding its allowances on an exchange.

Credit generated for the compliance market must from a higher standard project, which is regularly checked and verified by independent review boards appointed for each country. Each such project goes through rigorous testing and analysis to determine the resultant reduction of carbon emission or the amount of carbon it is in fact to remove from the atmosphere. Once validated and registered, the credits generated by a project known as Certified Emission Reductions (CERs).

Additionally they may consider the Voluntary market to be attractive financially and see goad reason to hold a portfolio of credits. Through Voluntary Emission Reduction (VERs) are verified by a third party, they do not carry the costs associated with Certified Emissions Reduction (CERs), which are subjected to much more stringent regulation, pushing up the price.

There is the two way of business mechanism of reduce emission. One it can reduce the GHGs by adopting new technology or improving upon the existing emission technology to attain the new norms of the emission of gases second, it can tie up with developing nations and help them set up new technologies that are ecofriendly, resulting earning carbon credits meet its emission reduction targets. Kyoto-Protocol provides three market based mechanism

(i) Joint Implementation (JI)

(ii) International Emission Trading (IET)

(iii) Clean Development Mechanism. (CDM)

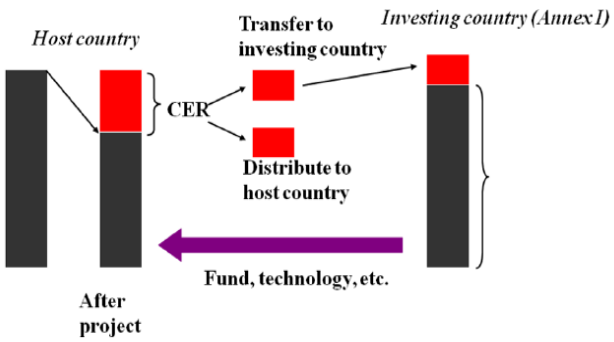

Fig. 2

Mechanism of carbon trading

Under the JI and IET, the developed countries can set up the project in another developed countries has relatively low cost earn the carbon credit as per the emission requirement and carbon credit can be exchanged between business/entities or bought and sold in international market at the prevailing market price respectively. Under the CDM, a developed country can take up a GHGs reduction project activity in a developing country where the cost of GHGs reduction is usually much lower, and the developed country would be given carbon credit for meeting its emission reduction targets.

Credit versus taxes

Carbon credits and carbon taxes each have their advantages and disadvantages. Credits were chosen by signatories to Kyoto protocol as an alternative to carbon taxes. A criticism of tax raising scheme is that

they are frequently not hypothecate, and so some or all of the taxation raised by a government would be applied based on what the particular nation's government consider most fitting. However, some would argue that carbon trading is based around creating profitable artificial market, and handled by free market enterprises as it is, carbon trading is not necessarily a focused or easily regulated solution.

As per the emission as a market commodity some proponents insist it become easier for business to understand and manage their activities, while economist and traders can attempt to predict future pricing using market theories. Thus the main advantages of a tradable carbon credit over carbon tax are argued to be –

(i) It may be provide a framework for rewarding people or companies who plant trees or otherwise meet standards exclusively recognized "green".

(ii) The price may be more likely to be perceived as fair by those paying it. Investor in credits may have more control over their own cost.

(iii) The flexible mechanism of the Kyoto protocol help to ensure that all investment goes into genuine sustainable carbon reduction schemes through an internationally agreed validation process.

The advantages of a carbon tax are argued to be –

(i) Possibly less complex, expensive, and time consuming to implement. This advantage is especially great when applied to market like gasoline or home heating oil.

(ii) Worth of carbon is stabilizing by government regulation rather than market fluctuations. Poor market condition and weak investor invest have a lessened impact on taxation as opposed to carbon trading.

(iii) Reducing incentives for companies to delay efficiency improvements prior to the establishment of the baseline, if credits distributed in proportion to past emission.

(iv) Perhaps some reduces risk of certain types of cheating; through under both credits and taxes, emission must be verified.

(v) When credits are grandfathered, this puts new or growing companies at disadvantages relative to more established companies.

(vi) Allows for more centralized handing of acquired gains.

Economics of global warming and emission market

Economics of global warming

Carbon credits create a market for reducing GHGs emission by giving a monetary value to the cost of polluting the air. Emissions become an internal cost of doing business and are visible on the balance sheet alongside raw material and other liabilities or assets.

Consider a company in market, which releases the 100 tons of GHGs per month in environment. Its government is an ANNEX I country that enacts a law to limits the emission that the business can produces. The government set up the quota of that company is 60 tons per month emission. The company have two options, either they reduce their emission up to 60 tons or purchase their own carbon credits as pre their requirement. So they are invest on to chosen the machinery, which more carbon or GHGs deficient or purchase the credits from open market from organizations that have been approved as being able to sell legitimate carbon credits. It may effect on production of the company but they have chosen the machinery instead the pollution efficient machinery, so they don't have need to purchase the credits.

A seller may have already invested in new low-emission machinery and have a surplus of allowance as a result. The company could make up for its emission by buying 40 tons of allowance them. The cost of the seller's new machinery would be would submit accounts for their emissions to prove that their allowances were met correctly.

Emission market

For trading purpose, one allowance or one CERs is equivalent to 1 ton of GHGs or CO_2 emission. It can sell privately or in international market at prevailing price which validate by UNFCC.

Climate exchanges have been established to provide a spot market in allowance, as well as future option market to help discover a market price and maintain liquidity. Carbon price are normally quoted in Euros (€) per ton of CO_2 or equivalence GHGs, which are multiple of CO_2 with respect to in global worming potential. These features reduce the quotas financial impact on business while ensuring that the quotas are met at a national and international level.

Currently, there are five exchanges trading in carbon allowance.

(i) The European Climate exchange,

(ii) NASCAQ OMX commodities Europe,

(iii) Power Next,

(iv) Commodity exchange Bratislava and

(v) European Energy Exchange.

Now in the India, the MXC product trade is a first carbon allowance exchange. In India € 24 is equal to one carbon credit (i.e. Rs. 1560).

Market price of carbon credits

Unchecked, energy use and hence emission level are predicted to keep rising over time. Thus the number of companies needing to buy credits will increase, and the rule of supply and demand will push up the market price, encouraging more groups to undertake environmentally friendly activities that create carbon credit to sell.

The market of a carbon credit is depends upon the carbon contain input, which is feed to get production of goods in factories (e. g. natural gases or coal, oil).

The social cost of carbon is the addition damage caused by carbon emission. The optimal carbon price or optimal carbon tax is the market price (or carbon tax) on carbon emissions that balance the incremental costs of reducing carbon emission with the incremental benefits of reducing climate damage. If a country wished to impose a carbon tax of Rs. 2040 ($ 30) per ton of carbon this would involve a tax on gasoline of about Rs. 20.4 (9 cents) per gallon. Similarly, the tax on coal generation electricity would be about Rs. 2.4 per kWh, or 10% of the current retail price. At current levels of carbon emission in the USA, a tax of $ 30 per ton of carbon would generate $ 50 billion of revenue per year (us).

Climate changing projects

These are sample categories or environmental projects which reduce carbon emissions and may generate carbon credit.

Renewable energy sources

Source of renewable energy, such as a wind form or hydroelectricity plant, generate significant reduction in GHGs emission and can get gain high levels of carbon credits. This type of projects has the added benefit of providing power as well as reducing emission.

Capture of fugitive emission and waste handling and disposal

Developing and installing technology which captures emission and waste and then either disposes of it in an environmentally friendly way or reuse it, result in a reduction in GHGs. This is the second biggest project type, as factories produce large amounts of waste are able to reuse it.

Manufacturing and chemical industries

These projects involve changing manufacturing process to make them more envision mentally friendly. Change to industrial processes can make significant reduction in carbon emissions.

Mining and metal production

These project involve changing production process to achieves significant reduction in carbon emissions and make them more environmentally friendly.

Transport

This refers to the process of switching transportation to less carbon incentives means or introducing new technologies to improve vehicle fuel efficiency.

Waste water treatment

Waste water treatment facilities have significant impact on reducing the environmental effects of various industrial processes.

Industries, which use innovation and technology to reduce this environmental impact arte suitable for significant credits based on CO_2 reduction.

Backbone of carbon credit

The overall process implemented by the Kyoto protocol to encourage emission reducing projects is known as clean development Mechanism (CDM) and its various stages are outline here. These stages are applicable to projects, which will be eligible for the compliance market. The process for the voluntary market may not involve energy stages.

These are a number of other project requirements for CDM projects; which must be met in order to qualify as a credit generating option the project needs to be undertaken in country, which has signed and ratified the Kyoto protocol. This provides a good deal of variety but it does exclude projects from the United State as currently, they have not ratified the protocol.

The project must also conform to the sustainable development requirements in the host country and must not have and unacceptable negative impact on other elements of the environments as a by-product. The host country must also have a project board which verifies potential CDM project and this is the point of contact for project developer in that country.

CDM project also have to confirm the concept of additionally. This means that all reductions in GHGs must be additional to what would have occurred without the project. Incorrect assessment of

additionally is the main reason for project submission to be held up or rejected completely (UNFCC, CDM Guidelines, 2008). The project development cycle cake below outlines the usual steps a project will go through in order to be registered and start receiving credits.

CDM project development steps :

- Indentation of project and e=development of project concept code by project developer.
- Development of project designed Document (PDD)
- Project description
- Select baseline approach and assess additionally
- Set base line emission level and creating periods
- Calculate net emission reductions
- Develop a monitoring plane
- Assess environmental impacts
- Invite local stake holders for comments
- Host country approval
- Submission of PDD
- Make PDD publicly available for 30 days
- Validation of project
- Submission of validation reports and PDD by operational
- Registration with the CDM.
- Project implementation and monitoring by the project developers
- Verification and certification by the operational entity
- Possible review by the CDM Executive board
- Issuance of CERs to project developers; (UNFCC, Guideline, 2010)

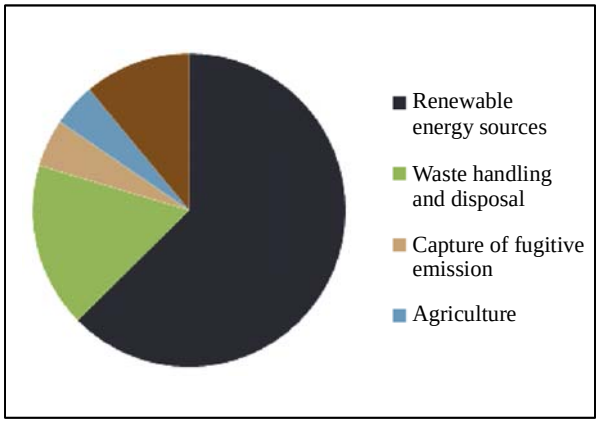

Fig. 3: CDM Distribution by type (%), UNFCCC, 2010

Main parties involved

CDM Executive Board (EB): Supervises the CDM, processes registration request, develops guidelines, and issues CERs.

Designed Operating Entities: Independent third parties which act as auditors for the project. They are certified by the EBM to check and validate the project design document (PDD, a technical document describing the projects).

Designated National Authorities (DNA): Each country involved in the DCM has a DNA. The authority is responsible for granting approval to local projects, which have fulfilled national criteria for sustainable development and with a good chance of succeeding at eventualregistration. They are a focal point for the project developers. The UNFCC maintain a list of DNAs.

Buyers: To raise finance, project developers may sell to buyers. They are involved by forward buying CERs at a lower price but with more risk, or option to take an equity stake in the underlying project. These CERs can be sold on later.

Project Developers: The Company which develops and operates the CDM project. These can include,

(i) Private sector companies

(ii) Government bodies

(iii) Finance institution.

Trading

Many active in carbon credit market, feel that, over time price will rise.

Risk and diversification

Some buyers, particularly large companies and government, are purchasing credits in order to demonstrate to the public and are concerned about the future of the global development.

In India Multiple Commodity Exchange (MXC) is the first Green Exchange Agency (2005). MXC is the future for India and Indian companies. After these many of the companies introduce their CDM plans exchange plans. For example,

(i) **BUDHIL** Hydro Electric Plant which is launch by **Lanco Power Trading Limited,** has CERs per million units is 810 and Euro rate per CER is 11.(July, 2011).

(ii) **Green ply Industries Limited** (GPL) is India's largest interior infrastructure company with turnover of Rs 1420 corers. It is the first in Indian industries and the only laminate manufacturer to get carbon credits under the UNFCCC. It has been earn 126.53 lacks from carbon credits (2009).

(iii) Reliance Power, expects that it would earn 2,000 corers by trading carbon credits from its 3960 MW ultra-mega power plant (UMPP) in Tilaiya, Jharkhand. The CDM executive Board of UNFCCC allowed the Tilaiya project Anil Ambani said had made a statement. This recognition of their company commitment to use of clean, green technologies for reducing carbon footprints and set a benchmark in the country (2012).

Further, National Commodity and Derivative Exchange (NCDEX) also launch a future deals for carbon credit issued Under UNFCCC on its exchange platform (April, 2008).

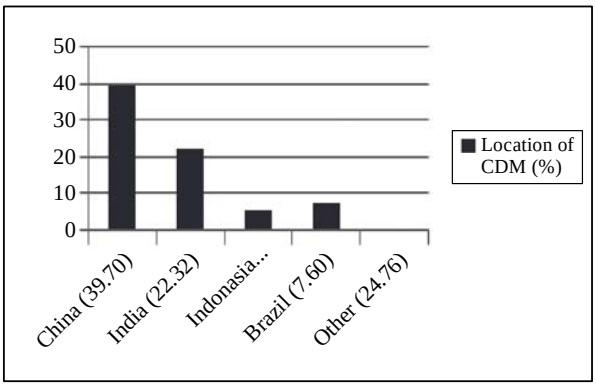

Fig. 4: Location of CDM (%)

How the carbon credit applicable for environmental management and growing economics

Carbon credit helps to avoid the deforestation

There is growing recognition that in other to achieve meaningful carbon emission reductions major process need to be achieved in avoided deforestation that is in reducing the rate of global deforestation. These realizations reflect the recognition that emission from deforestation constitutes 20-20% of global GHGs emission (IPCC, 2001) clearly, investing in reduction in deforestation could crowed out some investment in energy abatement technologies, so environmental groups and consequently many government, have for a long been skeptical of crediting avoided deforestation. Several recent studies, however, have suggested that ignoring avoided deforestation and other forest mitigation activities would be highly cost effective, and other forestry actions in climate stabilization policies could reduce overall cost by up to 50%. Recent efforts by many rainforest nations have raised awareness on the issue of avoid deforestation, and the concept of carbon credit for avoided deforestation has become a legitimate issue to be negotiated.

In order to address avoided deforestation, it useful to begin by outlining the international regions under which avoided deforestation could be included as an option.

Agriculture and biomass

A number of developing countries have large agricultural sectors but not the financial resources to make them environmentally sustainable. project which reduced animal waste such as methane, one of the most dangerous GHGs and change agricultural process technique to methods, which are more environmentally friendly, can achieve significant reduction in carbon emission.

It will also help in capture of methane. Methane capture systems are a cost effective way of tacking climate change and they use proven technology to address global warming. Methane fired power plants are already in use, turning the waste into energy. Project such as these produce carbon credit.

It is also applicable in biomass production and power generation. In India rice hocks are produces in large major. Estimate that one processing plants attached to a rise production factory would reduce emission by total of 322, 688 tons of CO_2.

This an average of 46,098 credits every year. The price of credits associated with a project such as this is likely rise.

Renewable energy sources and green technologies

Renewable energy play important roll to reducing the emission of GHGs, such as the solar power plant etc. At the Yale University (2009) had performed an experiment, in which they have been extract the biodiesel from algae-lipids. These types of sources may be remedy on the problem of fuel and to get a chance of earning the credits.

In Myanmar they use the different cooking stoves other than the traditional cooking stoves (i.e. three stone for cooking). These are highly inefficient, contribute to wide-scale deforestation and also lead to high level respiratory diseases particularly among women. The use of a fuel efficient stove can dramatically reduce the need for wood-fuel which in turn means that women spend less time foraging for fuel and suffer from fewer and illness. The carbon credits are associated with the reduction in unsustainable wood used. It is applicable in food making agencies in India and earn to credits.

In the developing countries, numbers of the slum are present. There is poverty and over-crowding, lacks of adequate sanitation and waste disposal leads to unhealthy, unhygienic and environmentally damaging conditions. Lack of accessible, affordable fuel and electricity inhibits income generation raises expenditure. The installation of biogas facilities address the issue of poor sanitation while providing a useful source of clean and free cooking fuel to slum dweller while reducing carbon emission as compare to costly fuel sources and large amount of emission sources of GHGs. Carbon credits are associated with the substitution of fossil fuel(usually kerosene) by a renewable energy source. Currently, these type of project going to develop in Indonesia.

The automobiles are main issue of environmental damage, which has traditional design, which emits the GHGs to their environment. By creating the new and fuel efficient designed engine or vehicle may be major CDM project for future and environmental management. For example, let us 10 motor bikes of traditional design engine emits 0.05 tons of CO_2, CO in atmosphere, instead of that newly design engine and fuel efficient emits only 0.01 tons of CO_2, COper year. So they are deserved for carbon credits.

India and carbon credits

India is developing country and India has the potential to build up their economics and industrial development, but as compare to other developing countries we are going so much slow. Since 1980, India had undergone the industrial revolution. In that duration we polluted to environment as only 5 percent overall the world.

Carbon credit has the dual nature for India and Indian industries. Because Indian industrial development is to be going slow, due to that India may not develop totally as Kyoto protocol concern. But Indian industries developed through CDM, green technologies and by the principle of carbon credit, then in India carbon credit may be a burring business and it will help to maintain the environmental management in India.

India being one of the leading generator of CERs through CDM, has a large scope in emission trading. Analyst forecast that its trading in carbon credits would touch US $ 100 billion by 2010. India has the 1/3 of the CDM over the entire world which registered by UNFCCC through CETs. In valve terms (INR), it could be running into thousands of cores. India has 633401547 (2012), source and trends of the carbon market 2007 world back is 6% only (2007).

Further, there has been a surge in number of registered projects in India. It is expected that with increasing awareness this would go further up in the future. The number of expected annual that CERs in

India is hovered around 28 million and considering that each of these CERs is sold for around 24 Euro an average, the expected valve is going to be around Rs. 4000 cores.

CONCLUSION

First thing, we have to observe that carbon credit is a burning business overall in the world and helps to maintain the environmental management through the economics, science and technologies. It will gain a bright future for developing countries through CDM, which may give clean and ecofriendly technologies, manufacturing, and green jobs to nation.

It is the child brain of Kyoto protocol. As the environment concern, it will be used for improving the environmental hazards, condition and helps to stop global warming.

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