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CARBON TRADING : A PRACTICAL APPROACH TOSUSTAINABLEDEVELOPMENT

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Introduction

As we know that average temperature of the earth's surface has increased and sea levels have risen up. Our agricultural yields are dropping. All these things do fascinate us but a new dawn awaitsfor all those who are ready to deal with a product which is intangible and exotic.Already many Indians are happy doing jobs, no one would have dreamt off a decade ago.
This job could relate with six substance we hate to breathe, carbon dioxide (CO_2), methane (CH_4), Nitrous oxide (N_2O), hydro fluorocarbons (HFCs) per fluorocarbons (PFCs) and sulphur hexafluoride (SF_6).

All these things have become possible because of changes taking place in the global temperature at an unprecedented speed. If emission continue to grow unabated at current rate it is almost certain that atmospheric level of carbon dioxide will double from per-industrial level during the 21st Century.

In 1988, the world meteorological organization and the United Nations Environment Programme (UNEP) created an organization called Intergovernmental Panel on climate change.

The Panel's finding made the government to create the United Nation Framework Convention on climate change (UNFCC). In 1997(UNFCC) assembled in Kyoto, Japan and started working on a business model which will help to emissions in the global atmosphere. The protocol, which became legally binding at midnight from 16thFeb, 2005, demands a 5.2 per cent cut in greenhouse gas emission from industrialized world. 141 countries accounting for 55 per cent of greenhouse gas emission have ratified the treaty.

There is a single model to understand the process involved in the market of emission which permits one organisation to continue to emissions environment while other may actually invest in technology upgradation so that less carbon is burnt less carbon is emitted in the environment. This will create a 'balance sheet' like position for the two organizations.

An organization which emits less emission than a predetermined permissible limit will have a positive balance sheet. It can then sell each ton of emission gas saved in the global market the organization which emits will have negative balance sheet. As a penalty it will need to put an equivalent quantity of emission from other efficient organization.

Thus the two will start negotiating will trade.

Transfer Emission Permits

Idea behind the transferemission permits is to create a market for pollution rights. A pollution right simply signifies a permit that consists of a specific pollutant. Under this approach government authorities have two functions.

1. They determine total allowable permits
2. Decide the mechanism to be distributing the initial pollution permits among polluters.

How do government authorities determine the total number of Units of pollutants? Ideally the total should be set by considering both the damage and control costs from the perspective of society at large. However, in practice, accurate estimate of damage and control costs may not be readily available because they may involve astronomically high transaction costs. Thus generally, the total number of permits is determined by government agencies using the best information available about both damage and control cost at a point of time. It is important to curb the abuse of national environment, the success of a transferable permit scheme very much depends on the total size of pollution permits.

Once the total number of emission permits is determined, the next step requires finding a mechanism by which the permits are initially distributed among polluters.
A system of transferable permits operates on the basis of following postulates.

1. It is possible to obtain a legally sanctioned rights to pollute.
2. The rights (permits) are clearly defined.
3. The total number of permits among the various polluters are assigned by government agencies. In addition polluters emitting in excess of their allowances are subject to a monetary penalty.
4. Pollution permits are freely transferable, that is they can be freely traded in market place.

To illustrate how a resource allocation system that is based on transferable permits is supposed to work, let us consider the following example.

Government agencies in some hypothetical state issue a total of 300 permits for a period of one year. Each permit entitles the holder to emit tons of CO_2. If there are two firms whose marginal cost differ from each other, government authorities issue an equal number of permits both firms. That is the maximum that each firm can emit into the air, i.e. 150 tons CO_2 per year. Finally let us suppose that in the absence of government regulation each firm would emitted 300 tons of CO_2 (or a total of 600 tons of CO_2) for both firms. Thus by issuing a total of 300 permits, the ultimate objective of government policy is to reduce the current level of CO_2 emission in the region by half (300 tons).

How transferable emission permits work. This graph shows that once a clearly defined pollution permit is created i.e. commodification of environmental pollution is achieved),individual firms will be guided via an invisible invisible hand to use environmental resources in a manner that is considered socially optimal.

To begin, let us look at situation that Firm 1 is facing. Given that it can discharge a maximum of 150 units of its CO_2, Firm 1 is operating at point R of its MCC_1 curve. At this point it is controlling 150 units of its CO_2 emission. For this Firm, The MCC_1 for the last unit of CO_2 is $ 500. On the other hand, Firm2 is operating at point S of its MCC_2 curve,and it is controlling 150units of its waste and releasing the other 150 units into the environment. At this level of operating, points, the MCC_2 of firm 2 is $ 2500. What is evident here is that at their current level of operations, the marginal control cost of these two firms are different.

More specifically, to treat the last unit of emission, it costs Firm 2 Five times as much as Firm 1($500v versus $2,500). Since permits to pollute are freely tradable commodities, it would be in the interest of Firm 2 to buy permit from 1 provided its price is less than $2500. Similarly Firm I will be willing to sell a permit provided its price is greater than $ 500. This kind of mutually beneficial exchange of permits will continue as long as at each stage of negotiation between the two parties, $MCC_2 > MCC_1$.That is as long as MCC_2 of Firm 2 exceeds that of Firm 1 will be in a position to supply pollution permits to Firm 2. This relationship will cease to occur when the MCC of the two firms attain equality, i.e. $MCC_2=MCC_1$. This equilibrium is reached at point E.

At this equilibrium point firm 1 is emitting 100 tons of CO_2 (or controlling 200 tons of CO_2).This means that Firm 1 is emitting 50 tons of CO_2 less than its maximum allowable permits. On the other side at equilibrium point, Firm 2 is emitting 200 tons of CO_2 50tons more than its maximum allowable pollution permit. However, Firm 2 is able it fill the deficit in its allowances by purchasing 50 tons worth of pollution permits from Firm 1. Note also that at equilibrium in the total amount of CO_2 emitted by these two firms is 300 tons which is exactly equal to the total pollution permits issued by Governments authorities.

What is desirable about the new equilibrium position (point E) is that it is cost effective through a system of transferable pollution permits. First not that satisfies the condition for cost effective allocation of resources, i.e. the marginal control costs of the firms under consideration are unequal. Using diagram given above it is also possible to know that both firms are better off at new equilibrium. At the initial level of operation (Point R and point S), the total pollution control cost of these two firms is represented by area. OESRU.

The total pollution control cost at the new equilibrium (point E) is measured by area OEU. Therefore by moving to the new equilibrium, the total control cost is reduced by areas ERS. This clearly constitutes a Pareto improvement since by moving from the old to the new position, on one is made worse off. This is because the movement is brought about by a voluntary and mutually beneficial exchange between the two firms.

Furthermore, like an effluent charge system, the use of transferable permits would provide strong incentive to encourage investment in new pollution control technologies.
Principal advantages of transferable emission permits are:

1. They are least interventional.
2. They are cost-effective, especially when the number of parties involved in the exchange of permits is large.
3. They provide observable market prices for environmental services.
4. They can be applied to a wide range of environmental problems.

Principal disadvantages of transferable emission permits are:

1. The idea of permits to pollute promotes, to some, reprehensible moral and ethical values.

2. They are ineffective when there are not enough participants to make the market function.
3. Permit can be accumulated by firms for the purpose of deterring entrants or by environmental groups for the purpose of attaining groups' environmental objectives.

Carbon Market Initiative

1. World Bank

As a trustee of the Community Development Carbon Fund (CDCF) recently signed two agreements with two Indian companies to promote technologies in the building material industry. One utilizes a more energy efficient kiln to produce burnt clay bricks and the other replaces burnt clay bricks with fly ash bricks which are manufactured without the use of thermal energy.

The first is the Vertical Shaft Bricks Kiln (VSBK) technology project which aims to improve the thermal performance of the brick manufacturing unit in select clusters, especially in the states of Chhattisgarh, Madhya Pradesh, Rajasthan, Utter Pradesh and West Bengal.

Technology and Action for Rural Advancement (TARA), the agency, which provides the VSBK technology in the country, intends to set up 126VSBK plants within two to three years through entrepreneurs. The nearly 4 lakh tons greenhouse emission reduction generated by the project over 10 years will be purchased by CDCF.

Fly Ash Brick : The Fal-G project is the other initiative that intends to replace environmentally damaging burnt clay building bricks with fly ash brick, which is manufactured using industrial wastes/by products. The project will facilitate the setting up of about 100 microindustrial plants in Tamil Nadu, Karnataka, Orissa and Uttar Pradesh to manufacture fly ash bricks using theFal- G technology.

Mr. N Kalidas, Executive Director of Carbon and the founder director of Institute of solid waste Research and Ecological Balance, Vishakhapatnam said, with the World Bank's assistance in fetching carbon revenues entrepreneurs would generate more enthusiasm contributing tom the rapid proliferation of the technology to meet our company's vision. CDCF will purchase 6 lakh tones of greenhouse gas reduction over a 10 year period from the Fal- G project.

The construction sector in India is considered one most carbon- intensive sectors representing about 17 per cent of India's carbon dioxide (CO_2) emissions roughly equal to 17 crore tones (170 million tons) of carbon dioxide (CO_2) emission per year.

2. Asian Development Bank

Keeping in mindshortage in carbon credits and increasing demand for them, The Asian Development Bank has decided to set up a fund this year that will support initiatives in developing countries to produce clean energy and in turn carbon credits.

The Carbon Market Initiative (CMI) which is in consultation phase is expected to get funds from companies that might be required to buy carbon credits under the Kyoto Protocol. The Fund will be ready by the year end.

"There are not enough carbon credits available for companies to buy. There is a need to create such credit", says Mr. N. Lohani, Director General and Chief, Complains Office of ADB's regional and Sustainable Development. He further adds, "The CMI will be mechanism to boost the viability of alternative clean energy sources in developing countries and to assist developed countries meet their commitment under the Kyoto Protocol. It can be an effective tool for addressing two of the most pressing global issues- energy security and climate to change".

The ADB has prepared a four year road map for its three phased energy efficiency initiative. The initiative is aimed at assisting developing countries (IMCs) in changing their energy use pattern and to secure a low carbon future in the region.

Mr. Haruhito Kuroda, ADB President has announced $1 billion for clean energy project.

The initiative had completed the first phase that brought home the message about the need for ADB action and investment.

The second phase will see preparation of operational details in 2007. The Bank will study the energy efficiency, potential, policies, and specific investment market segments in DMCs.

It will consult Governments and the main stake holders in target countries and select priority market segments and define investment instrument.

3. Asian Carbon Exchange (ACE) and New Values

They have announced the World's first on-line auction of forward certified emission reduction (CER) contracts arising from clean development mechanism (CDM) in Asia; companies that are engaged in projects that could qualify to generate CERs (after getting clearance from the UN panel) can enter in to forward CER contracts with the buyer through the platform. In order to trade on line Firms wanting to sell potential car bon credits are required to list their project design document at the on line exchange. Buyers in the auction would be able to assess these projects related documents which will help them determine the price and volume of CERs they want to bid for, before a transition is confirmed.

4. European Carbon Fund (ECF)

It has firm up plans to invest upto $125 million about Rs 500crores in carbon assets in India over the next two years. ECF is the first European private fund dedicated to carbon finance. Ten large European Banks have parked with it huge funds to be invested in creating carbon assets, which are market based greenhouse gas (GHG) emission reduction instruments. Financiers and environment experts joined hands in early 2005 to create the ECF which is managed by IXIS Environment and infrastructures as asset management Firm specializing in environment and infrastructure sectors and registered in Luxembourg.

ECF is keen to fund projects in the areas of wind, hydro, solar biomass and other alternative energy sources. Professionally managed Indian Companies with a strong social commitment will have access to these funds.

ECF seeks to acquire 10 million tons of CERs (Carbon emission reduction) from projects in India. In addition to Kyoto Protocol the EU launched the emission trading scheme, and emission trading market of 2.2 billion tons of CO_2 per year covering 25 countries and 11,500 Industrial and power generation sites.

The annual shortage for European entities is expected to be in the range of 60-120 million tons of carbon dioxide. This provides the basic for the ECF investment strategy. In the last six months ECF studies have identified potential for million of tons of carbon credits purchases in developing or transitional countries in Latin America, Asia, Eastern Europe and Africa.

Indian Scenario: Path and Opportunity

1. Indian Railways

As an alternative revenue source from its non-core operation, Indian Railways plan to tap its massive carbon credit potential to start with. It has identified five projects that will result in lower carbon emission.The ministry expects a revenue of Rs. 16-17 crore per year initially, a figure that may go up or more projects are taken up.

M/s Ernest Young has already been invited to make a presentation. The areas which it has specified for its plan of action are as follows:

1. Large scale Electrification, which results in lower emission than when trains are run on diesel.
2. Bio- diesel venture and use of gas driven locomotive in sub-Ur ban areas. The Railway uses 14 % biodiesel mixed with diesel in southern Railways which result in reduced carbon emission.

2. Kalptaru Power Transmission Ltd. (KPTL)

In Rajasthan this project generates electricity from mustard crop residues, and recently became the first Indian project and third project worldwide to which the UN panel issued carbon credit under the Kyoto protocol HPTL's Rajasthan project was one of the top few Indian projects that were registered by the CDM panel at the United Nations frame work convention for climate.

Opportunity for Professionals

Engineers: They are much sought after professionals as they are required in capacity building projects improve operational efficiency of an Organization.

SrikantPanigrahi, Director, Planning Commission, says thanks close to 2000 Indian organizations have already registered with the government to undertake such projects. The job of the technical crew does not end with implementing technology upgrading and placement projects; many get absorbed in international project certifying agencies and brokerages.

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Environmental Experts: They also stand to gain from identifying such opportunities and auditing performances is an integral part of such activities. Even projects like afforestation and reforestation are considered as many countries have lost considerable forest area to land sharks. If a reforestation project can be conceived that countries emission by generating more oxygen, the project implementing authorities can participate in the global market.

Chartered Accountants: All such projects involve huge cash flow and continue for years. Book keeping is quite a task for such big projects. With international funding agencies like Japan bank for International Cooperation (JBIC) and German KFW pumping money into the value chain, the market has really grown. JBIC has been cooperating with several Indian consultants for formulating projects in India", says Murakami Yasou senior representative of International bank.

Consultancy: It has also opened doors to Global Consultancy houses. Companies like Ernst and young price water House Coopers and shell are some of the big employers likewise many brokerage houses have also surfaced who understand the networking between a buyer and seller. For a seller in India, it is often difficult to find a buyer in far-flung European nations which are emerging as big players.

Non-Governmental Organizations: NGO'share also extending their hand. They are involved in awareness creation and training activities.

Remunerations are highly lucrative and can competewith the best jobs in the market. A person with two to four years of experience can earn upto Rs. 10lakhs a year; as experience increases Pay packets get multiplied easily. The downside is that this is not a market for fresher's. Unfortunately institutions do not as yet offer specialization in this subject; traditional course in environmental sciences try to dope students with a chapter or two on this aspect. B. K. Chowdhury of Indian Institute of Social Welfare and Business Management say that qualified energy management professional can feel the vacuum.

Projects Which Could Qualify for Emission Tradition

A long held belief among the environmentalist is "What is good for Ecology is good for Economy too". Now with availability of carbon credits subsidy, this is truer than ever.

Landfills Projects

All municipal corporations in India used Land fill technique to get rid of household waste. The household waste is simply dumped in land-fills located on city outskirts. Due to anaerobic composing of waste, such land filled generates considerable methane gas, igniting fires and generating undesirables smoke. The Supreme Court has issued a directive to the municipalities to take action to avoid such pollution.

Now with carbon credits it will be feasible for municipal bodies to subsidies project that generate electric power from the methane gas emanating from land-fills. By separating the house hold waste, manmade materials such as paper plastic, glass metals etc, cab be recycles and the organic part of the garbage composted using aerobic composting techniques, preventing methane generation and claiming credits.

Sewage Treatment Plants

Very few of India's **municipalities** Treat sewage, thus, polluting downstream rivers or seas. All such untreated sewage increases the carbon content in water bodies, generating undesirable growth of water Hyacinth and Algae and killing other beneficial aquatic life. If the local bodies treat the sewage water and recover methane to generate power such projects can claim carbon credits. Large housing colonies, College Hostels etc, can run back up power generation plants from the abundant methane gas available in sewage.

Social Forestry Schemes

Plants absorb carbon and hence, social forestry schemes qualify for carbon credits. However we need to avoid monoculture plantations that may not help maintain the ecological balance.

Congregation Projects

Industry can implement waste heat recovery and congregation projects that reduced emissions and save power and hence qualify for carbon credits.

Hydro/Wind Power Plants

Coal based power plants release three times more carbon than hydel or wind powered system. Hydroelectric, wind power plants and solar heating system thus qualify for subsidy of carbon credits.

Solar Heating Projects

Solar heating avoids burning of fossils fuels and is hence a good candidate for carbon credits. India can go for community kitchens for the masses using solar energy. For instance, a school offering midday meal or temples, mosques and Gurudwaras feeding devotees. All they need to do is adopt solar heating to claim carbon credits.

Projects that are for greater benefit of community qualify as gold standard projects which apart from reducing carbon dioxide emission as a result in community development, poverty alleviation and employment generation, ensuring quick financing. The Kyoto Protocol gives Asian countries a unique change to replace old technologies with sustainable ones.

Conclusion

India is the fastest growing economy among emerging economies of the world. India ranks 6th in the world in green house emission hence India's responsibility for pollution control becomes very crucial; to tap this opportunity carbon trading on stock exchange has also been allowed.

India's CDM potential represents a significant component of the Global CDM market. As on January 2008, 309 out of a total of 918 projects registered by the CDM executive board are from India, which so far is the highest from any country in the world. The Indian Nationalism CDM authority has accorded host Country approval to 858 projects facilitating an investment of more than Rs. 71.121 crores. These projects are in the sector of energy efficiency fuel switching, industrial processes, municipal solid waste and renewable energy. If all these projects get registered by the CDM Executive Board they have the potential to generate 448 million Certified Emission Reduction (CERs) by the year 2012.

References

1. Pandit, P.N.(2006), Carbon credits: Silver lining to Global warming, Business Line 06 June
2. Saha, A. (2005), step on the Gas, *Economic Times*, 10th October.
3. Bhattacharya, R. (2004), Environmental Economic: An Indian perspective. Oxford University Press.
4. Hussen A.M., Principles of Environmental Economics. Routledge, London.
5. Arquitniederberger, A and R Spalding-Fecher(2006). Demand –side Energy Efficiency Promotion under the Clean Development Mechanism: Lessons learned and Future Prospects' Energy for Sustainable Development. Special Issue on Climate Change Mitigation and Sustainable Development, December, pp. 51-64.
6. Bailis, R (2006), "Climate Change Mitigation and Sustainable Development through Carbon Sequestration: Experiences in Latin America", Energy for Sustainable Development December, pp 74-87.
7. IPCC(2007a), Climate Change 2007: The Physical Science Basis: Summery for Policy makers, Contribution of working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change available from http://www.ipcc.ch.
8. IPCC(2007b), Climate Change 2007: Impacts, Adoption and Vulnerability, Contribution of Working Group II to Fourth Assessment Reports of the Intergovernmental Panel on Climate Change, Geneva, Switzerland, April 2007, http://www.ipcc.ch
9. IPCC(2007c), Climate Change 2007: Migration of Climate Change, Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, Geneva, Switzerland. Summary for Policymakers May 2007. Full Report October 2007, http://www.ipcc.ch.
10. India (2004), India's Initial National Communication to the United Nations Framework Convention on Climate Change, Ministry Environment and Forests, Govt. Of India.
11. Kyoto Protocol (1997), The full text of the Kyoto Protocol can be seen at: http//unfecc.int/resource /docs /convkp /kpeng.htm.