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Carbon Credits and India: Contemporary Scenario and Future Prospects

Karan Gupta¹, Himani Mahajan², Humayun³, Nadeem Ahmad⁴, Shubham Kapoor⁵

Assistant Professor, Department of Electrical Engineering, GCET, Jammu, Jammu and Kashmir, India¹

Lecturer, Department of Electrical Engineering, GCET, Jammu, Jammu and Kashmir, India²

B.E. 7th Semester, Department of Electrical Engineering, GCET, Jammu, Jammu and Kashmir, India³

B.E. 7th Semester, Department of Electrical Engineering, GCET, Jammu, Jammu and Kashmir, India⁴

B.E. 7th Semester, Department of Electrical Engineering, GCET, Jammu, Jammu and Kashmir, India⁵

ABSTRACT:The unprecedented and unanticipated outcry across the globe over climate change has made the adoption of stringent norms inevitable. In this situation of now or never, faced together by the rich and the poor, developed and the underdeveloped, the first and the third worlds, it is incumbent upon every nation to play the best role which strikes the balance between domestic and global priorities. The literature below peeps into the possibilities at India's disposal of subverting carbon emissions while keeping the engine of economy running efficiently. The strengths are highlighted with adequate emphasis on the accompanying road blocks. The economics of carbon credits then follows at length which has been presented in the envelope of its possibilities.

KEY WORDS:Green Economy, Carbon Market, Carbon Emission Trading, Carbon Taxes, CERs.

I. INTRODUCTION

There are firm estimates that if the rail goes by the current track, the carbon credits economy will be the largest trade market in the coming decades. Governments all over the globe are mooting serious estimations and challenges with regards to the same. Efforts are on to effectively alter the incumbent energy bias in favour of carbon. Hence there is a need to transform the energy basket into a credit generating one with particular emphasis on the sustainable energy engines, which can drive everything larger for anytime longer.

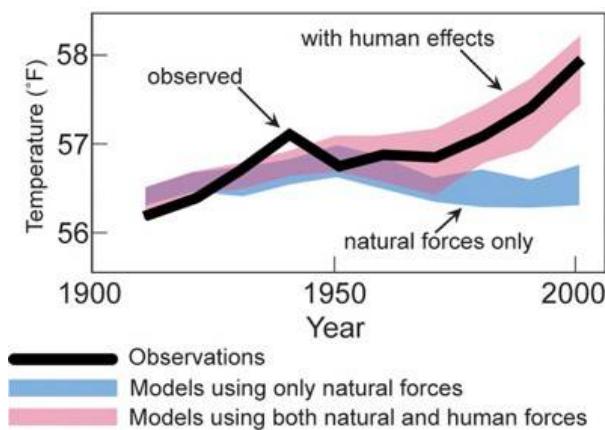
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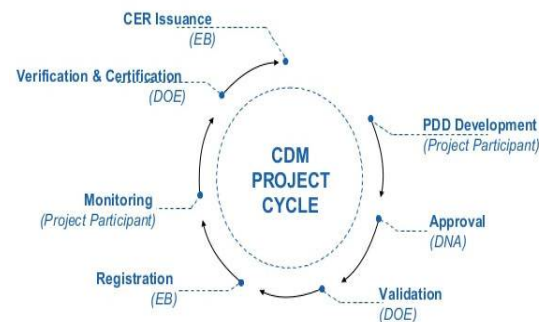
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Vol. 6, Issue 11, November 2017

II. GREEN ECONOMY



(a)



(b)

There is widespread agreement among environmental economists that market-based programs to deal with the threat of climate change can achieve desired results at a modest cost. Another innovative method is to create a market-based approach, i.e. the 'cap & trade' system. It involves creating a restricted number of tradable emissions permits that can be traded in the open market to get the 'right' to these emissions. This sets a cap on overall discharges and provides a financial incentive to reduce emissions. This can also be combined with the 'tax' method for a hybrid solution. The Clean Air Act of 1990 introduced this system for power plants' emissions of sulphur dioxide, leading to a reduction of almost half the emissions, reducing acid rain.

When a firm in India invests in a renewable energy source to meet growing energy needs, it may be able to acquire carbon credits. These carbon credits can be traded on international markets generating income for the owner of the credits. Carbon credits, which are issued to organizations based on their efforts to limit climate change, and renewable energy projects are intricately linked in India.

The World Bank estimates that in 2006 approximately US \$5 billion worth of CER were sold. The Exchange added CER Futures for trading in March 2008, followed by CER Options in May 2008. The CER for December 2008 delivery was trading at about US \$30 (EU €21) on September 1 on the European Climate Exchange.

There are several powerproducing technologies that are eligible for generating green energy under Clean Development Mechanism(CDM). These are:

- Solar
- Wind
- Small hydro-power facilities
- Biomass, bio-fuels

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Sources	Approx. Potential
Biomass Energy	19500
Solar Energy	20000
Wind Energy	47000
Small Hydropower	15000

Table 1: Estimates of potential capacities from renewable energy sources (in MWs)

Solar:

Solar energy is undoubtedly one of the most profusely obtainable forms of energy which can be the major solution to our everlasting energy demand. Out of 174PW (Petawatts) of solar radiation received by the Earth only about 70% is absorbed by clouds, oceans and land masses the rest 30% being reflected back into the space. The present technology available is not enough advanced to harness all of the incoming radiations into usable form. The most common technology commercially used for this purpose is solar photovoltaic cell. It is a device that transforms solar radiations into electric current using the principle of photoelectric effect. A cluster of solar photovoltaic cells electrically connected to each other form a photovoltaic module. Solar PV projects are emerging popular due to its property of converting solar energy directly into electricity. It can become a great source of energy at those places where grid electricity is economically unviable. Although, the capital linked with solar PV projects are high, project designers are still keen in solar PV for their countless benefits. Various Companies are providing subsidies like generation based incentives, feed in tariff and other benefits for solar projects. Recently India projected National Solar Mission under its National Action Plan on Climate Change to encourage solar energy in the country.

The chief advantage of Solar PV projects is that they are eco-friendly and unlike fossil fuel do not generate any emission by-products. The Solar PV plants have enough potential to replace the need of electricity generation through conventional sources of energy like coal, natural gas etc. and can be aid in fulfilling energy demands by supplying power to the Grid. Hence such projects are eligible to earn carbon credits under the Clean Development Mechanism (CDM).

Registered CDM Projects – Solar Energy				
Ref No	Project title	Project Developer	Annual emission reduction (Carbon Credits)	Emission reductions till 2020 (Carbon Credits)
4024	iHOT – I water heating service	Anu Solar Thermal Private Ltd.	28,350	2,84,757
3757	Bundled Solar Water Heater Project	G K Energy Marketers Pvt Ltd	22,746	2,27,460
2699	D.light Rural Lighting Project	D.light Energy Pvt Ltd	30,052	3,00,523
2279	Rural Education for Development Society (REDS) CDM Photovoltaic Lighting Project	Rural Education for Development Society (REDS)	21,060	2,10,600

Table 2: Registered CDM Projects of Solar Energy

The Wind Market and Carbon Credit Financing

The Wind Energy Market is no slouch in generating Carbon Credits than other markets in competition. The carbon credits can be calculated depending upon the conventional energy sources being displaced. For instance, if 10MW is generated from a small Hydro Plant, then the same fossil fuel based generation would have emitted 20,000 to 25,000

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tonnes of carbon. However, most of the generation utilises renewable and non-renewable resources in harmony so the actual carbon credits math is reduced by the percent of energy that is fossil fuel based.

The market of wind energy in India has developed its fair position among the other leading markets. In Madhya Pradesh, more than 11,000 CERs have been issued to a 6.3MW Wind Energy Project for reducing GHG emissions in a year. Another project is expected to be commissioned with 15,245 CER annually for ten years. The project can generate US \$305,000 annually at a price of US \$20 per CER. The emerging hydroelectric projects are grabbing advantages of carbon credit financing. The state of Uttarakhand is already having a dynamic number of hydroelectric projects of various capacities under progress while many new ones are being proposed all ranging from 0.4MW to 230MW based on numerous rivers flowing in the state. Also, a few ones having capacities upto 100MW are based on the water storage.

Hydro and Carbon Credits

The Clean Development Mechanism (CDM) was designed to bring clean and sustainable development to developing countries while allowing developed countries to accomplish their emissions reductions cost efficiently. Hydro power makes up 30% of all projects registered under the CDM. Hydro power is the largest source of renewable electricity globally. Hydro power makes up 16% of installed electricity capacity worldwide. China and India, the two countries with most hydro power CDM projects, have ambitious targets for building out their hydro power resources. The reasons include attempts to meet increasing power demand. Over 1000 hydro power projects are already registered under the CDM and another 700 are applying for registration. Almost 90% of all hydro projects in the CDM pipeline are located in China, India, Vietnam and Brazil. Three of the four countries (China, India, and Brazil) are ranked within the top 10 hydroelectricity producing countries worldwide. By 2020 CERs from all CDM hydro projects are likely to generate over 2.4 billion credits, roughly 23% of all credits from the CDM. Projects therefore need to accept into the CDM only because of the extra financial support from the sale of carbon credits. The Indian Government plans to add over 46GW of hydro power between 2008 and 2018. Government play a leading role in deciding how much and which hydro power projects are built, taking into account factors other than those that are directly capital-related. In the case of Indian hydro power, the commission takes into account of energy security concerns, dislocation of people, the requirement for peak power, and the competing uses of rivers for irrigation and flood control. In autumn 2011, the 412 MW Rampur Hydroelectric Project located near Rampur in Himachal Pradesh was registered by the CDM Executive Board. The project could receive 15 million carbon credits from 2012 to 2022.

Biomass & Carbon Credits

When a manufacturer exceeds its emissions quota, it must buy credits from either another company that is below its limit, or from a carbon sequestration project, such as a forest or in grassland, that results in a decrease of net atmospheric carbon dioxide. Grasses or crops in no-till or strip till are well acknowledged for their capability to absorb or reduce carbon. As plant grows, it gathers biomass. This biomass grows increasingly using atmospheric carbon in photosynthesis. A quickly growing forest, for example, has a large annually incremental increase in biomass and thus has a large capacity to absorb carbon from the atmosphere. This capability of forest to absorb carbon makes it an important source of credits projects. Moreover, carbon absorbed through no-till or strip till is stored in biomass and in soil. Carbon credits can also be generated when fossil fuels are replaced by carbon-neutral fuels. Such example is swapping coal with forest or agricultural biomass in electricity generation.

State	Biomass Power Projects	Bagasse/Biomass Cogeneration projects
Andhra Pradesh	20	4
Bihar	3	
Chhattisgarh	17	1
Gujarat	7	
Haryana	2	3

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Vol. 6, Issue 11, November 2017

Himachal		1
Jharkhand		1
Karnataka	10	7
Madhya Pradesh	6	2
Maharashtra	16	6
Orissa	2	
Punjab	16	10
Rajasthan	10	1
Tamil Nadu	11	4
Uttarakhand		3
Uttar Pradesh	6	26
West Bengal	2	1
Total	128	70

Table 3: Details of Biomass Projects in India

The Indian CDM system includes various biomass projects. One third of the 133 companies that receive carbon credits are biomass power projects. But they are small in size and add up to only eight per cent of the total Carbon Emission Reduction India earns. The 133 projects have sold 4,994,670 CER at the rate of US \$ 17.7 per CER which is about ₹ 402.73 crore. The CDM benefit from biomass projects, roughly 6,500 CER per MW generated in a year, would amount to about ₹ 52.41 lakh. This means a 10 MW plant earns up to ₹ 5.24 crore annually in carbon credits. The only interference to increasing number of biomass-fuelled projects getting CDM benefits is that neither the raw material is not maintained at a certain level or rate nor is the price predictable. That is the reason the government has begun to endorse biomass plantations.

An official at MNRE said the department is employing a UN Development Programme-Global Environment Facility-assisted project on Removal of Barriers to Biomass Power Generation in India. The aim of this project is to increase the implementation of biomass power technologies. It recommends removing barriers by promoting fast-growing trees and oil-bearing plants raised by local societies.

Project	Average Annual Emission Reduction (CERs)
Bundled Waste Processing Facilities in India	158,077
Gorai Landfill closure and Gas Capture Project, Mumbai, India	124,028
Installation of Bundled Composting Project in the state of Tamil Nadu	115,162
Upgradation and expansion of APMC compost plant at Tikri, Delhi	35,329
Establishment of compost production unit of 100TPD at Lalganj	42,050
Upgradation, operation and maintenance of 200TPD composting facility at Okhla, New Delhi	33,461
Avoidance of methane emissions from MSW and food waste through composting	23,431
MSW based composting at Kolhapur, Maharashtra	30,430
The Timarpur-Okhla Waste Management Company Pvt Ltd's (TOWMCL) integrated waste to energy project in Delhi	262,791
SESL 6MW MSW based power project at Vijayawada & Guntur, Andhra Pradesh	64,599

Table 4: Details of CDM Projects in India

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III. ECONOMICS OF CARBON EMISSIONS

It can be seen in contrast to command and control initiatives such as technology standard enforcement (BATs etc.) or subsidies or sin taxes. Rather it channels the thought advancement in a progressive manner to retain flexibility for private players to sustainably absorb transitional shocks as well as at the same time stimulate them to emulate the best practices as well as embrace the newest of innovations to bring down carbon costs.

Essentially, environment pollution forms an 'externality' as it does not cause any entailment on part of the polluter and therefore there are no monetary compulsions or motivations for him to move from an established and profound methodology of energy procurement to relatively infant and unconventional means.

The essence of carbon emissions trading is the creation of artificial Keynesian market so as to materialise the otherwise implicit and abstract costs of carbon emissions and make them economically penal. It can be best understood as a flexible environmental and economic regulation that incentivizes the subversion of carbon emission and mooted of ingenious innovations to mitigate the back-stepping burden of carbon footprint.

The economic model

A central agency such as a government fixes an overall limit on emissions and it identifies permits to border the authorizations to emit to the said level. These permits can be floated into an open market through various mechanisms which may include direct selling which is not used due to various anomalies such as market capturing. So alternatively, these may be distributed to the participants which each of them being allocated permits parallel to the participant's baseline emissions. Determination of the baseline limit is pivotal to the success of this model. It may be decided based on a balanced cohesion of the energy audit of the participant as well as the efficiency and compliance discipline.

Now exploiting the liquidity of the emission permits, a firm has an open choice to utilise fully its limit of permits or otherwise emit less in carbon and make money of the rest of permits. It can, in other cases of transitional rigidity opt to breach its limit at the cost of buying permits from those who have successfully moved to vacate the limited carbon space.

We thus see that the model serves the multiple purposes of reward and punishment, as well as the involuntary behavioural shift towards carbon emissions and hence infusing the implicit temptation in them to do away with these in as many ways as possible and in as much amounts as possible as well as acting a cushion cum dampener for the operational, technical or procedural stiffness. This basic model can fit into the shoes of any particular situational requirements with the requisite level and number of modifications or confinements.

Emission Trade Centres

In UFGCC's carbon credit trading there are six transnational exchanges currently in form, viz. the European Climate Exchange, NASDAQ QMX Commodities Europe, Power next, Commodity Exchange Bratislava, the European Energy Exchange and the Chicago Climate Exchange (Till 2010).

In these markets, one emissions permit is meant to signify one metric tonne of carbon dioxide. The synonyms for these permits are carbon credits or Certified Emissions Reductions or Kyoto units. These are tradable both privately as well as in the international market.

Emissions trading and the counterparts

Pollution Taxes:

Pollution taxes basically intend to raise the prices of carbon utilisation. Emission trading when placed against them has various advantages that it acclimates with inflation very coherently and so responds better to cost changes since it plays in free market and the regulator does not need to oversee its working and alter the cess rates. Also the prices drop in cases of sluggishness and recession thereby acting favourably for economic revival. But setting up complex trade arrangements may require the redress of institutional constraints.

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Vol. 6, Issue 11, November 2017

Command-and-control Regulation:

As mentioned before command and control mechanisms are much stiff and there is absolutely no rigidity. Moreover they create unavoidable shifting of burden to the end consumer and hence inter-firm carbon exchange is not possible which severely mars the ability of differentiation in terms of business diversity.

Moreover, the diversity of the ease of carbon reduction methods available at one's disposal are better taken care of in the credit exchange mechanism.

IV. CONCLUSION

There is no doubt in the fact that India has currently become the fastest growing all over the world. The Carbon Credit market will soon is gaining popularity with a rapid rate but it still remains to be seen how well it holds up to the expectations of the traders and investors in the long run. The given paper primarily focuses on the CDM projects in India and makes a brief inter-industry comparison. The pricing of Carbon Credits is still quite unpredictable in imminent future. The effects of demonetisation and a new tax reform i.e. Goods and Services Tax (GST) might help boosting up the development in renewable sectors which still remains to be seen.

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