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Carbon Trading Practices in India - A Conceptual Study

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Abstract: ***Speeding up the use of climate mitigation technologies is crucial if efforts are made to curb climate change especially in developing countries where environmental impact, economic growth, market management , revenue management, and stakeholder participation in climate change is low. Several intergovernmental agencies have developed unique programs in support of Climate change mission. This article focuses on the structure and regulation of Sustainable Low Carbon Markets (SLC), as stated by governments in their National Sustainable Development Goal (SDG) taking into account the goals and principle of UNFCCC and how this enables or limits the transition of priority low-carbon technologies to these markets. The Indian commodity market, conventional energy and renewable energy hold considerable promise role to address issues of jurisdiction and market participation will remain crucial, to find market mechanisms to achieve strategic clean energy goals in the country so that our commodity markets can effectively fulfill their risk mitigation role in this important sector of the economy.***

Keywords: Sustainability, Carbon, Trading, Growth, Emission, Tax

1. Introduction

Sustainable development has been identified in many ways, but the most widely quoted concept emerges from known as the Brundtland Report (1987): "Sustainable development is growth that meets current needs without reducing future generations ' ability to meet their own needs." There are different aspects of sustainability that we need to recognize, environmental and societal. Sustainability of the environment' refers to the need for sustainable growth to maintain the nature and habitats. There is no doubt that any cycle of development that changes the makeup of the global ecosystem and puts pressure on environmental and socio-economic systems that are already under strain because of population and economic growth is a challenge to sustainability. Sustainable development should therefore try to maximize growth while making effective and sustainable use of the limited natural resources available to ensure that they last for a long time. Sustainable development priorities have gained ground both globally and locally. The G20's flagship initiative launched at its Pittsburgh Summit (September 2009) is the Framework for Solid, Sustainable and Balanced Development. At the Rio+20 Summit in June 2012, the United Nations endorsed the idea of implementing Sustainable Development Goals (SDGs) in the post-2015 period when the 2000-2015 Millennium Development Goals (MDGs) timeframe will begin. Last year, G20 members also worked together to form a Climate Finance Study Group to explore ways to leverage resources effectively, taking into account the goals, guidelines and principles of the United Nations Framework Convention on Climate Change (UNFCCC). The public-private dialog platform on inclusive green investments (DPIGI) is currently being officially launched, especially among developing countries. There is direct relationship between energy, environment and sustainable development.India has invested heavily in power plants, refineries, power stations, pipelines, highways, railways and improving coastal infrastructure to meet rising energy demands and also curbing the GHG emissions.

2. Purpose of the Study

India's action plan, called a roadmap for business readiness, is key to achieving the nation's climate goals. India is preparing to reduce its emissions intensity by 33–35 percent below 2005 rates by 2030, under the Paris Climate Agreement. This could be supported by a national carbon market and also promote social development. To investigate this possibility, World Resource Institute (WRI) India is running carbon market simulations. However The Paris climate agreement allows nations to be flexible in their approach to cutting carbon. A carbon market would align India's economic and social goals with the Sustainable Development Goals of the United Nations. India's policy agency, NITI Aayog, has already mapped SDG priorities and objectives to the nodal ministries. If policymakers connect SDGs with India's climate action plan, carbon market trading will help the nation achieve both its conservation and economic development goals. India is the biggest beneficiary of carbon trading and it is expected that over a period of time India will gain $5 to $10 billion. Therefore, the government of India wants to achieve the climate goals through a sustainability approach that simultaneously addresses other environment and developmental challenges. This paper aims to analyses a sustainable low carbon (SLC) scenario based on sustainable strategies and to contribute to the literature on policy interaction by examining the conditions under which a cap-and-trade ETS (Emission Trading System) for CO2 emissions may usefully coexist with other climate-policy instruments

3. Review of Literature

(**Cushing et al., 2018)** The study showed that climate change can be slowed down by reducing GHG emissions

because it can have a substantial impact on the quality of air and the health benefits of the society's less Beneficial residents. In communities with a higher proportion of people living in poverty, GHG emitting facilities and the temporal correlation between GHG and co-pollutant emissions suggests that incentivisation for deeper reductions in local GHG emissions may help environmental equity objectives.

(**Garg & Arya, 2015)** It was concluded that Indian market is very sensitive to the process of clean growth. The Indian supremacy in the trading in carbon is now starting to influence market dynamics in the region, under the UNFCCC's clean growth mechanism. India has a wide number of sellers of carbon credits, but purchasers in the European market cannot enter the market under the new Indian regulations. Modification Bill has been introduced in the Indian Parliament to expand the demand for carbon trading forward contracts (Regulation). It will also enable traders and farmers to use NCDEX as a carbon credit trading forum. However, it is necessary to create a specific legislation in order to unleash the true potential of carbon marketing in India as the Indian Contract Law is not adequate to control the contractual problems associated with carbon credits

(Bhanawat, 2015) The study shows that very few businesses in India will produce more than 1 per cent of their overall income from carbon credit trading. The trend in carbon credit income in the Indian corporate sector is also declining. In terms of revenue generation from carbon credit trading, there was no major difference among the individual companies.

Anita Shukla and Nidhi Vyas (2013) addressed the theoretical basis for environmental accounting and reporting with particular reference to ONGC, BPCL. They thought that the environmental accounting practices scenario had not been transformed in India after proper research. Company's environmental policy shows that they are making every effort to enhance environmental protection, but the research findings do not show the ecological value, liability and ecological expenditure.

(**Nair & Nandkumar, 2013)** The study concluded that Indian environmental and industrial policies have an immense carbon trading opportunity. In order to promote industry and society's awareness of various aspects of environmental pollution, of its mitigation strategies and of carbon finance in particular, public and private interventions are urgently needed. In this regard the carbon consultancy service may play a larger role and contribute to adding a new dimension to environmental consultancy and financial services. It has proposed that India has a substantial carbon credit capability.

(Gray Otte, (2008) In its article 'GHG Emissions Accounting' it claimed that if they implement Green Accounting, the business would have some internal and external advantages. GHG (greenhouse gas) pollution accounting includes keeping track of pollution, monitoring them, and reporting them later. The contact mechanism between the companies and the suppliers will be strengthened by implementing the GHG method which would, in turn, lead to cost reductions. Green accounting has limitations and barriers too. Yet the author addresses several ways in which the agency can resolve those barriers

4. Objectives of the Study

- To study the concept and importance of the Carbon Trading.
- To identify the strategies and mechanism of Carbon Trading in India.
- To analyses project- wise carbon reduction initiative taken by Government of India.

5. Analysis and Interpretation

5.1 Concept of Carbon Trading

Carbon trading is an exchange of credits between nations designed to reduce emissions of carbon dioxide. Carbon emissions trading accounts for most emissions trading. has been widely and increasingly remains a central concept in proposals to mitigate or reduce climate change and global warming .When countries use fossil fuels and produce carbon dioxide, they do not pay for the implications of burning those fossil fuels directly. There are some costs that they incur, like the price of the fuel itself, but there are other costs not included in the price of the fuel. These are referred to as externalities. These externalities are often negative in the case of fossil fuel use, which means that the use of the goods has negative effects on third parties. These externalities include health costs, (like the contribution that burning fossil fuels makes to heart disease, cancer, stroke, and lung diseases) and environmental costs, (like environmental degradation, pollution, climate change, and global warming). Interestingly, research has found that climate change burdens often affect countries with the lowest emissions of greenhouse gases most directly. So, if a country burns fossil fuels and produces these negative externalities, they should pay for them. The carbon trade originated with the 1997 Kyoto Protocol, with the objective of reducing carbon emissions and mitigating climate change and future global warming. At the time, the measure devised was intended to reduce overall carbon dioxide emissions to roughly 5% below 1990 levels by between 2008 and 2012. Essentially, the amount of carbon they are permitted to emit is restricted to each state. Trading in carbon emissions also allows countries with higher carbon emissions to buy the right from countries with lower carbon emissions to emit more carbon dioxide into the atmosphere. Carbon trading also refers to individual businesses ' ability to trade polluting rights through a regulatory system known as cap and trade. Less polluting companies can sell their unused emissions rights to more polluting companies. The goal is to ensure that cumulative businesses do not surpass a target level of pollution and provide companies with a financial incentive to pollute less.

5.2 Regulatory Framework of Carbon Trading in India

The Multi Commodity exchange started future trading on January 2008 after India's government on January 4

accepted carbon credit as commodities. Through a notification and with the approval of Forward Market Commission (FMC), the National Commodity and Derivative Exchange introduced Carbon Credit's future contact with the goal of providing market visibility and helping producers earn remuneration from environment ventures.Carbon credit in India is traded on NCDEX only as a future contract. Futures contract is a standardized contract between two parties to buy or sell a specified asset of standardized quantity and quality at a specified future date at a price agreed today (the futures price). The contracts are traded on a future exchange. These types of contracts are only applicable to goods which are in the form of movable property other than actionable claims, money and securities.

India is governed by the Indian Contract Act, 1872.Under the existing regulation of the Forward Contracts Regulation Act, forward contract dealing will be deemed as null as no physical delivery will be provided against such contracts. The amendment Bill 2006 was introduced in the Indian Parliament to rectify this The Forward Contracts (Regulation). The ordinance to amend the Forward Contracts (Regulation) Act, 1952, was authorized by the Union Cabinet on January 25, 2008.Parliament will pass this ordinance and this year it is expected to come up for consideration. This Bill also amends the concept of "forward contract" to include "derivatives of commodities." The concept actually only includes physically deliverable' goods.' However a government notification released on 4 January paved the way for potential CER trade by adding carbon credit to tradable commodities.

5.3 Carbon tax (not related to Kyoto Protocol)

- It is a tax on all fossil fuels in proportion to carbon dioxide emissions. Proposed in may developed and developing countries. India has a carbon tax of sorts in Budget of 2010-11 introduced a cess of Rs. 50 per tonne of both domestically produced and imported coal later it was increased to Rs. 100.
- With the introduction of the Goods and Service Tax (GST), the Clean Energy Cess was abolished in 2017. A new cess on coal production, called the GST Compensation Cess of Rs. 400 per tonne is put in place. This cess is used to raise revenues for the National Clean Energy Fund.

5.4 Important Factors Responsible for the Development of Carbon Trading

- ***Sustainability and Growth - The Conflict and the Balance***

Economic progress is raising our living standards and making our lives more comfortable. On the other hand, this very advancement could perhaps lead to environmental degradation. Any rise in national income would only result from increased production of goods and services requiring increased consumption of resources such as land, forests, fuels, etc., the availability of which is essentially limited. Although some of these resources may be permanent, others become depleted and ultimately exhausted with constant use.In fact, the conflict between economic development and conservation is a conflict between short-term and long-term goals, between current and future generations ' interests. Large natural resource exploitation today, while increasing economic growth for the present generations, will lead to the steady decline and deterioration of these resources, thereby reducing their availability to our future generations and adversely affecting their production, income and living standards. Environmental degradation affects not only us, but also affects our future generations.

- ***Global Cooperation and Efforts***

Sustainability of the ecosystem has a regional aspect. Considering that greenhouse gas (GHG) emissions accelerate the global warming process in any country, this is clearly an environment where a global cooperation solution is required. Unless it is part of a global compact, no country will have enough opportunities to curb its own emissions. Such a compact, in effect, can only be done if the burden is fairly distributed. Developing countries have consistently argued that since it is the industrialized countries that have contributed the bulk of GHG's accumulated stock historically and are also the most capable of paying; they must bear the burden of global mitigation and adjustment.A comparison of carbon dioxide (in short, coal) emissions across the G20 countries shows that Australia, the United States and Canada were the top three carbon emitters in 2010, with carbon emissions in metric tons of 18.8, 18.1 and 16.3 per capita respectively. In terms of carbon emissions, Brazil, Indonesia and India sit at the edge of the G20, with per capita contributions of 2.3, 1.6 and 1.4 metric tons respectively in 2010, well below the developed countries. According to the 2012-13 Economic Survey, India's per capita carbon emissions in 2031 will be about 4 tons, which will still be 4.22 tons lower than the global per capita emissions in 2005 and about 75% lower than the top three emitters ' 2010 levels.

- ***Reducing Global Wastage***

An integral part of profitable business model is to reduce waste and reduce running costs and increase profitability in the process. According to reports, between 30 and 50% (around 1.2-2 billion) tonnes of food produced worldwide never reaches a human stomach. Although waste in sub-Saharan Africa and South-East Asian countries, like India, tends to occur mainly at the farmer-producer end of the supply chain due to inefficient processing, insufficient local transport and weak storage facilities, production is often wasted by retail and consumer behavior in developed countries such as the United Kingdom. Surveys also show that in India At least 40% of all fruits and vegetables are lost to farmers and customers due to lack of refrigerated transport, bad roads and weather conditions. Wasting food means losing not only nutrition that supports life, but also valuable resources, including land, water and energy. In growing crops that never meet the market, about 550 bn cubic meters of water are wasted globally. Within India, water output in agriculture, which absorbs about 80% of our water resources, is only about 38%, compared poorly with 45% in Malaysia and Morocco and 50% to 60% in Israel, Japan, China and Taiwan.

5.5 Carbon Trading Mechanism in India

- **Perform Achieve and Trade mechanism (PAT):** This is also known as cap and trade mechanism in which reduction of specific energy consumption in energy intensive industries associated with enhance cost effectiveness through certificate of excess energy saving which can be trade. There are a number of ways that a cap and trade system can operate, but here are the basics. A government issues a limited number of annual permits requiring a certain amount of carbon dioxide to be emitted by businesses. Thus, the total allowable amount becomes the "cap" on emissions. When businesses produce a higher rate of pollution than their licenses allow, they will be taxed. Companies that reduce their emissions may sell to other companies, or "trade," unused permits.But each year, the government reduces the number of licenses, thereby reducing the overall pollution limit. That makes it more expensive to get permits. Industries have an opportunity over time to invest in clean technology as it becomes cheaper than buying licenses.

- **Clean Development Mechanism (CDM):** The Clean Development Mechanism (CDM), established in Article 12 of the Protocol, requires a country under the Kyoto Protocol (Annex B Party) to introduce a plan to reduce emissions in developing countries.For example, a rural electrification project using solar panels or installing more energy-efficient boilers may require a CDM project operation. The framework promotes sustainable development and emission reductions, while providing some flexibility to industrialized countries in how they achieve their goals for emission reduction or restriction.Indian companies have been able to cash in on the carbon market's sudden boom, making it a favorite place for buyers of carbon credit. India is expected to gain from carbon trading (Rs 22,500 crore to Rs 45,000 crore) for at least $5 billion to $10 billion over a period of time. India is also one of the main beneficiaries of global carbon trading through the Clean Development Mechanism, which claims about 31% (CDM).

- **Joint Implementation:** The process known as "joint implementation" allows a country with a Kyoto Protocol (Annex B Group) emission reduction pledge to gain emission reduction units (ERUs) from an emission reduction project in another Annex B Party, each equal to one ton of CO2, which can be counted towards achieving its Kyoto target.

Joint implementation provides Parties with a flexible and cost-effective means to fulfill part of their Kyoto obligations, while the host Party profits from foreign investment and transfer of technology.

5.6 Government Initiative in Reduction of Carbon Emission in India

India was one of the early signatories of the Montreal Protocol on ozone depletion and, as of 1 January 2010, the production and consumption of ozone depleting substances such as chlorofluorocarbons (CFCs) used in almost all refrigerators and air conditioning systems. It is on track to complete phase-out of hydro-CFC production and consumption by 2030. The government is also making clear efforts / policies within the country to ensure the protection of the environment. These include policies such as Cooperative Forest Management, Green Habitat Assessment Score, and Coastal Regulation. As far as India is concerned, resolving environmental issues remains fully committed to the global initiative. India is involved in current international UNFCCC negotiations and was part of 94 multilateral environmental agreements. India fully protected its interests at the recent Doha Conference (December 2012) and succeeded in placing the equity dimension. India also pledged to reduce its GDP's carbon intensity by 20-25% over 2005 rates by 2020 and 30-35 % by 2030. Emission in India were estimated to have grown by 6.3 percent in 2018 due to pushed by strong economic growth require as per projection by Global Carbon Project. India is among four major emitter in 2017 (07 percent), China (27 percent). USA (15 percent) and European Union (10) and rest 41 percent by world. Coal is still major source of energy production in India which resulted India's GHG emissions (excluding land use and forestry) was 115 percent during 1994-2014.The energy sector contributing to the maximum share of GHG emission 61.30 percent in 1994 which went up to 70.70 percent in 2010 and 76.60 percent in 2014.

Table 1: Electricity Capacity Targets

Technology	2017-18		2021-22		2026-27	
	MW	Percent of Total capacity	MW	Percent of Total capacity	MW	Percent of Total capacity
Coal	197122	57	217283	45	238181	38
Gas	24897	07	24897	05	24897	04
Diesel	838	00	838	00	838	00
Nuclear	6780	02	10080	02	16880	03
Hydro	45293	13	51301	11	63301	10
Solar	21651	06	100000	21	150000	24
Wind	34046	10	60000	13	100000	16
Small Hydro	4486	01	5000	01	8000	01
Biomass	8839	03	10000	02	17000	03
Total Installed Capacity	344002	100	479399	100	619047	100

Sources: Coal Tranastion in India, TERI, Yojana

The above table shows that India's commitment as part of its pledges under Paris Agreement that India has to increase the share of non-fossil fuel power generation capacity to 40 percent by 2030. This shift from fossil fuel generation (coal and Gas) to solar, wind, hydro and nuclear based generation is an important step to control near about 73 percent of India total emissions. Some major highlights of India's Climate action for emissions reduction as follows.

- As part of the National Mission on Enhanced Energy Efficiency, the Bureau of Energy Efficiency (BEE) has established the Perform, Achieve and Trade (PAT) Scheme. Under the Energy Conservation Act, 2001, nine energy-intensive industries were notified as' designated consumers.' These are power plants, fertilizers, cement, iron & steel, chlorine alkali, coal, railways, textiles and pulp & paper companies that consume energy above certain levels. The implementation of PAT scheme lead to saving of energy of 8.67 Metric Tonne of Emission(MTOE) in year 2015 which is about 1.25 percent of total energy supply in the country .This is also mitigating 31 million tonnes of carbon emission.
- Solar installed capacity has increased by 9 percent from 2.63GW to 23.28GW during March 2014 to 2018.
- Forest and tree cover increased from 24.01 to 24.39 percent during 2014 to 2017 as per India State of Forest Report (ISFR).
- Second Phase of PAT scheme has started in 2016 by restoring capacity of targeted saving of 19 MTOE.

Table 2: Electricity Capacity Installed

MW Installed CDM 2012		
CDM Type	Project	MW
Wind	785	13452
Biomass	301	2327
Hydro	193	7535
Solar	168	2874
Methane	40	55
Fuel switch	39	11955
Landfill gas	27	58
EE own generation	94	1447
Geothermal	0	0
Mix Renewable	9	79
EE Supply	27	19122
EE Industry	71	8
Total	1754	58912

Source: World Bank, IRENA

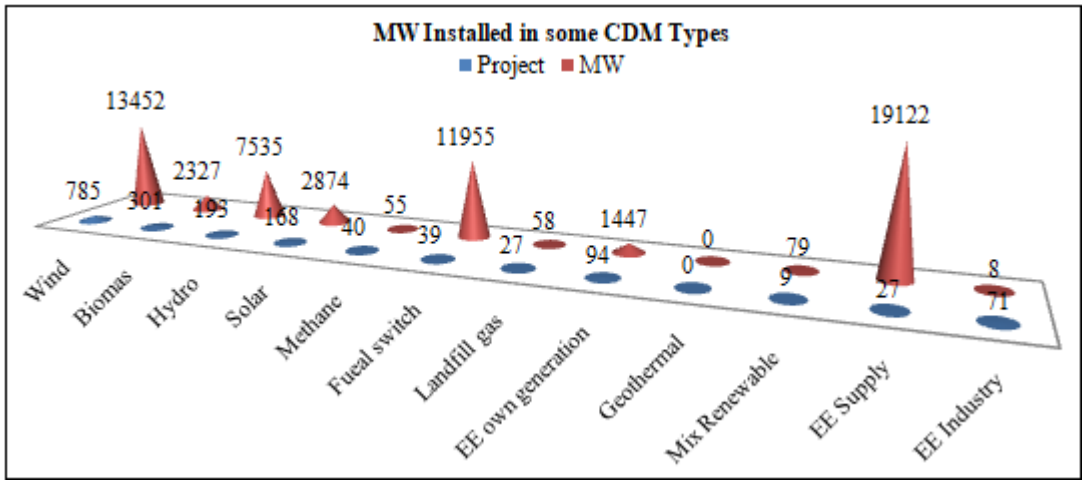

Chart 1

From the above table and graph it is observed that total number of project registered and Megawatt installed capacity of electricity generation through CDM pipeline is 1754 and 58912 respectively. The table shows that highest–lowest project registered in wind and mix-renewable energy sector which is accounted to 785 and 09 respectively. It is also observed that under EE Supply, Wind and Fuel Switch sector contributed 48 percent of the total project and 75 percent of the installed capacity of the electricity generation and rest 25 percent by the remaining sector in the CDM pipeline project. Whereas EE industry contribution in carbon reduction is lowest in all registered project in all sector is only 8MW of the total capacity installed. The table also shows that per- capita project in the CDM installed capacity highest in EE Supply and Lowest in EE Industry which is 708.221 and 0.11 respectively.

Table 3: Carbon Reduction Emission Certificate (CERs)[1]

Type (rejected projects excluded)	Expected issuance from CDM projects in Pipeline				CDM project with CERs issued		
CDM projects issuance in the pipeline by type	Projects	2012 KtCO2e	2020 KtCO2e	2030 KtCO2e	Total Issued	Total Expected	Issuance success
CO2 usage	0	0	0	0	0	0	0
Geothermal	0	0	0	0	0	0	0
Tidal	0	0	0	0	0	0	0
Afforestation	1	44	145	261	0	0	0
Agriculture	1	1	75	75	0	0	0
Coal bed/mine methane	1	0	175511	219313	0	0	0
PFCs and SF6	2	1267	4386	4425	34	109	31
Energy distribution	4	0	946	1084	0	0	0
HFCs	8	75366	106784	106785	105585	72642	145
N2O	8	6135	23930	37802	1709	2402	71

1CER is equal to 1 kilo tonne of carbon emission

Fugitive	9	931	2769	2989	165	159	104
Mixed renewable	9	0	502	1884	0	0	0
Transport	10	1316	9412	16153	4061	4326	94
Cement	13	13786	15444	15444	2516	5367	47
Reforestation	19	4321	7111	11993	2388	2347	102
EE service	26	56	2031	3698	9	15	60
EE supply side	27	4900	100118	137778	1734	4625	37
Landfill gas	27	3287	15465	20791	1710	5645	30
Fossil fuel switch	39	24835	223057	298244	27225	52700	52
Methane avoidance	40	2371	7745	12708	1704	2594	66
EE households	61	1189	17193	22593	1041	3644	29
EE industry	71	6881	19524	23503	2294	3994	57
EE own generation	94	33459	67391	83391	20388	24825	82
Solar	168	588	27141	68506	2215	3322	67
Hydro	193	16778	181177	311334	15741	20447	77
Biomass energy	301	39308	114647	146220	18010	23762	76
Wind	785	35202	210513	322125	41778	50749	82
Total	1917	272021	1333017	1869099	250307	283674	
Projects with negative or terminated validations by DOEs or rejected by EB or withdrawn or replaced are not included.							

Sources: World Bank, IRENA-CDM Pipeline

The above table indicate that the numbers of project registered in CDM Pipeline is 1917 during the period from 2012-2020 and the expected benefit of carbon reduction in these project is 272021 and 1333017 kilogram Tonne of carbon emission. The major contribution made in carbon reduction in 2012 is from HFCs, Biomass and Wind viz-75366, 39308 and 35202 $KtCO_2e$ respectively. The lower contribution from CO_2Usage, Geothermal etc just equal to zero, whereas expected carbon reduction in 2020 is highest in some sector such as – Fossil Fuel Switch, Wind and Hydro viz 223057,210513 and 181177 $KtCO_2e$ respectively. The total issuance of Certificate Emission Reduction (CERs) is 250307 out of total expected 283674 CERs and overall success rate for the period of 2012-2020 is 88 percent of the total expected CERs issuances. The sector wise issuance of CERs is highest in HFCs, Fugitive and Reforestation which is more than 100 percent of which was expected viz 145,104 and 102 percent respectively. Also the half of the sector issuance rate is more than 50 percent and half of sector issuance rate is less than 50-0 percent

6. Findings of the Study

- Emission intensity of India's GDP has reduced by 21 percent over the period of 2005-2015 under PAT scheme
- The share of non- fossil sources in installed capacity of electricity generation increased to 70 percent of total energy supply.
- The study also found that more plantation have done during the period of 2013 to 2017 to restore the environment which will brings nearly $10billion income through carbon credits.
- The study also found that in India there is a proper mechanism and regulation for carbon trade through Asia's First exchange MCX and NCDEX.
- The study found that EE Industry sector has major emission in total carbon emission but not contributing as required to reduce the emission and shift from carbon based energy to clean energy.

7. Suggestion

- A comprehensive plan require because carbon emission has been widely criticized. It is seen as a dangerous distraction and a half measure to solve the large and pressing issue of global warming through economic perspective of trade only.
- The Global cooperation require not only few countries may perform well environmentally and others large emitter buy credits through economic power. However the overall emission not reduced it mitigate only through green country.
- The emission reduction obligations not only should on emerging world only. It should be on developed countries too and they should provide financial and advance technology to the developing economy to mitigate overall carbon emission targets

8. Limitation of the Study

- The study is taken only theoretical background of the carbon Trading practices in India in due consideration of global standards.
- Although the study has keen information of carbon saving but not has concrete empirical research.
- The study has not considered voluntary compliance of carbon saving rather it took market based allowance of emission trading system (ETS).
- The study has myopic view on environmental impact limit to India only rather to the world economy as well because cost and benefits analysis are not easily measurable.

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