

## **An Analysis on Carbon Credit**

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### **I. INTRODUCTION**

A Carbon Credit is a generic term for a certificate representing a reduction of one ton of greenhouse gasses (GHG) in the atmosphere. The international drive to lower GHG emissions has created a multi-billion-dollar global market for Carbon Credits. The World Bank recently announced that ‘Carbon market trading reached a record value of \$176 billion in 2011 spurred on by secondary trading volumes. These are a tradable permit scheme. It is a simple, non-compulsory way to counteract the greenhouse gasses that contribute to climate change and global warming. This creates a market for reducing greenhouse emissions by giving a monetary value to the cost of polluting the air. The Carbon Credit is new currency and each carbon credit represents one ton of carbon dioxide either removed from the atmosphere or saved from being emitted. These are also called emission permit. It is in the Environment and Pollution Control subject. These are certificates awarded to countries that are successful in reducing emissions of greenhouse gases. These are generated as the result of an additional carbon project. These can be created in many ways but there are two broad types:

1. Sequestration (capturing or retaining carbon dioxide from the atmosphere) such as afforestation and reforestation activities.

2. Carbon Dioxide Saving Projects such as use of renewable energies

These credits need to be authentic, scientifically based and Verification is essential. Carbon credit trading is an innovative method of controlling emissions using the free market. Global economies grow, use more natural resources, and emit more Carbon Dioxide (CO<sub>2</sub>); more solutions will be needed to reduce global warming. People have become increasingly concerned about the possible effects of global warming. Global warming is a serious threat to humanity as a whole. Since CO<sub>2</sub> is the main contributor to the effects of Global Warming the Greenhouse Gases are known collectively as CO<sub>2</sub> emissions. At some point the build-up of carbon dioxide and other greenhouse gases in the atmosphere will change the climate disastrously. The financial markets provide one unique way of limiting CO<sub>2</sub> emissions through the creation of a carbon credit market. The concept is that this would give companies, countries, and individuals a financial incentive to produce less CO<sub>2</sub>. Its goal is to stop the increase of carbon dioxide emissions. It encourages compliance and financial managers to pursue cost effective emission reduction strategies and provide incentives to emitters to develop the means by which emissions can inexpensively be reduced. Carbon credits and carbon markets are a component of national and international attempts to mitigate the growth in concentrations of

greenhouse gases (GHGs). One carbon credit is equal to one metric tonne of carbon dioxide, or in some markets, carbon dioxide equivalent gases. Carbon trading is an application of an emissions trading approach. Greenhouse gas emissions are capped and then markets are used to allocate the emissions among the group of regulated sources. The goal is to allow market mechanisms to drive industrial and commercial processes in the direction of low emissions or less carbon intensive approaches than those used when there is no cost to emitting carbon dioxide and other GHGs into the atmosphere. Since GHG mitigation projects generate credits, this approach can be used to finance carbon reduction schemes between trading partners and around the world.

There are also many companies that sell carbon credits to commercial and individual customers who are interested in lowering their carbon footprint on a voluntary basis. These carbons off setters purchase the credits from an investment fund or a carbon development company that has aggregated the credits from individual projects. Buyers and sellers can also use an exchange platform to trade, such as the Carbon Trade Exchange, which is like a stock exchange for carbon credits. The quality of the credits is based in part on the validation process and sophistication of the fund or development company that acted as the sponsor to the carbon project. This is reflected in their price; voluntary units typically have less value than the units sold through the rigorously validated Clean Development Mechanism.

## II. OBJECTIVE OF THE STUDY

To study the evolution of carbon credits in India & also to ascertain the impact of oil and gas, power on Carbonex, Greenex & Sensex.

## II. SCOPE OF THE STUDY

Carbon Credits as dependent variable on other factors like Carbonex, Greenex, Sensex, Oil & Gas Prices, Power, etc. exclusively and their mutual

variations. The data is collected from BSE/NSE which includes average monthly data for 15 values.

## III. NEED FOR THE STUDY

Carbon credit trading can open up a new cash source to companies who are able to maintain their emission levels well within the permissible limits. The overall ecological balance is preserved. The company or country gets rewarded for applying clean technology in its production process. A much better corporate and social image which wins public approval. Encourages activities like tree plantings which would help reduce soil salinity, improve water quality and enhance biodiversity.

## IV. RESEARCH METHODOLOGY - DATA SOURCE

This study is based on Primary data which includes daily indices' monthly averages of all the factors (Carbonex, Greenex, Oil & Gas, Power, & Carbonex) with BSE from 3 Dec' 2012 to 28 Feb'13.

## V. STATISTICAL TOOL

The statistical tools used for analysis are Skewness, Kurtosis & Correlation to establish relations between all these factors considered to check the validity of the correlation.

## VI. LIMITATIONS

It is found that administering transactions with Carbon Credits becomes very difficult as it is on wide global Scale. Hence chances of fraudulence go up. On a market level, capped companies are at a competitive disadvantage against that Uncapped because firstly they are giving off deadly emissions at a much higher rate than what is allowed and secondly they have to pay uncapped countries and buy their Extra credits from them. Also there is only ONE internationally agreed mechanism-The Kyoto Protocol. If the UNFCCC comes up with a few more, then certain parts of the world can be looked after by any one such mechanism. Hence fraudulence chances can be reduced to a Great extent. **BSE's popular**

**equity index - the S&P BSE SENSEX** - is India's most widely tracked stock market benchmark index. It is traded internationally on the EUREX as well as leading exchanges of the BRICS nations (Brazil, Russia, India, China and South Africa).

## VII. THEORITICAL FRAMEWORK

### **Information on Kyoto protocol**

**The Kyoto Protocol to the United Nations Framework Convention on Climate Change (UNFCCC)** is an international treaty that sets binding obligations on industrialized countries to reduce emissions of Green House Gases. The UNFCCC is an environmental treaty with the goal of preventing "dangerous" anthropogenic (i.e., human-induced) interference of the climate system. 190 countries (all UN members, except Afghanistan, Andorra, Canada, South Sudan and the United States), as well as the European Union are Parties to the Protocol. The United States signed but did not ratify the Protocol and Canada withdrew from it in 2011. The Protocol was adopted by Parties to the UNFCCC in 1997, and entered into force in 2005. As part of the Kyoto Protocol, many developed countries have agreed to legally binding limitations/reductions in their emissions of greenhouse gases in two commitment periods. The first commitment period applies to emissions in 2008-2012, and the second commitment period applies to emissions in 2013-2020. The protocol was amended in 2012 to accommodate the second commitment period, but this amendment has (as of January 2013) not entered into legal force. 37 countries with binding targets in the second commitment period are Australia, all members of the European Union, Belarus, Croatia, Iceland, Kazakhstan, Norway, Switzerland, and Ukraine. Belarus, Kazakhstan and Ukraine have stated that they may withdraw from the Protocol or not put into legal force the Amendment with second round targets. Japan, New Zealand, and Russia have participated in Kyoto's first-round but have not taken on new targets in the second commitment period. Other developed countries without second-round targets are Canada (which withdrew from the Kyoto

Protocol in 2012) and the United States (which has not ratified the Protocol).

In Doha, Qatar, on 8 December 2012, the "**Doha Amendment to the Kyoto Protocol**" was adopted. The amendment include New commitments for Annex I Parties to the Kyoto Protocol who agreed to take on commitments in a second commitment period from 1 January 2013 to 31 December 2020. International Emission trading allows developed countries to trade their commitments under the Kyoto Protocol. They can trade emissions quotas among themselves, and can also receive credit for financing emissions reductions in developing countries. Developed countries may use emissions trading until late 2014 or 2015 to meet their first-round targets. Developing countries do not have binding targets under the Kyoto Protocol, but are still committed under the treaty to reduce their emissions. Actions taken by developed and developing countries to reduce emissions include support for renewable energy, improving energy efficiency, and reducing deforestation Under the Protocol, emissions of developing countries are allowed to grow in accordance with their development needs. The treaty recognizes that developed countries have contributed the most to the anthropogenic build-up of carbon dioxide in the atmosphere (around 77% of emissions between 1750 and 2004), and that carbon dioxide emissions per person in developing countries (2.9 tonnes in 2010) are, on average, lower than emissions per person in developed countries (10.4 tonnes in 2010). A number of developed countries have commented that the Kyoto targets only apply to a small share of annual global emissions. Countries with second-round Kyoto targets made up 13.4% of annual global anthropogenic greenhouse gas emissions in 2010.<sup>1</sup> Many developing countries have emphasized the need for developed countries to have strong, binding emissions targets. At the global scale, existing policies appear to be too weak to prevent global warming exceeding 2 or 1.5 degrees Celsius, relative to the pre-industrial level

**Kyoto protocol serves three purposes:** 1. Avoids restrictions on growth because pollution is strongly

linked to industrial growth, and developing economies can potentially grow very fast. 2. It means that they cannot sell emissions credits to industrialized nations to permit those Nations to over-pollute. 3. They get money and technologies from the developed countries in Annex II.

**KYOTO’S Flexible Mechanism:** The Kyoto Protocol provides for three mechanisms that enable countries or operators in developed countries to acquire greenhouse gas reduction credits. Under **Joint Implementation (JI)**, a developed country with relatively high costs of domestic greenhouse reduction would set up a project in another developed country. Under the **Clean Development Mechanism (CDM)**, a developed country can 'sponsor' a greenhouse gas reduction project in a developing country where the cost of greenhouse gas reduction project activities is usually much lower, but the atmospheric effect is globally equivalent. The developed country would be given credits for meeting its emission reduction targets, while the developing country would receive the capital investment and clean technology or beneficial change in land use. Under **International Emissions Trading (IET)**, countries can trade in the international carbon credit market to cover their shortfall in allowances. Countries with surplus credits can sell them to countries with capped emission commitments under the Kyoto Protocol. These carbon projects can be created by a national government or by an operator within the country. In reality, most of the transactions are not performed by national governments directly, but by operators who have been set quotas by their country.

**Facts and Figures on Carbon Credits:**

1. According to World Bank estimates, India could emerge as one of the beneficiaries accounting for 25 per cent of the total world carbon trade.
2. India is considered one of the largest beneficiaries in carbon credit trade accounting for about \$5bn annually 27 billion tonnes of GHG are being produced.
3. 175 countries that account for 60% of the global emission are now cutting their green house gas emission.

U.S. has not ratified the protocol despite being the single largest emitter, accounting for 30.3% of global emissions.

4. Further, the number of approved project from India stands at 753+

5. The total number of CDM projects registered with CDM-EB has reached 1056 with Indian CDM Projects leading and CERs issued are 143,760,593. India is the largest supplier of CERs after China.

**SETTING A MARKET PRICE FOR CARBON:**

Unchecked, energy use and hence emission levels are predicted to keep rising over time. Thus the number of companies needing to buy credits will increase, and the rules of supply and demand will push up the market price, encouraging more groups to undertake environmentally friendly activities that create carbon credits to sell. An individual allowance, such as an Assigned amount unit (AAU) or its near-equivalent European Union Allowance (EUA) may have a different market value to an offset such as a CER. This is due to the lack of a developed secondary market for CERs, a lack of homogeneity between projects which causes difficulty in pricing, as well as questions due to the principle of supplementarity and its lifetime. Additionally, offsets generated by a carbon project under the Clean Development Mechanism are potentially limited in value because operators in the EU ETS are restricted as to what percentage of their allowance can be met through these flexible mechanisms. Yale University economics professor William Nordau’s argues that the price of carbon needs to be high enough to motivate the changes in behavior and changes in economic production systems necessary to effectively limit emissions of greenhouse gases. Raising the price of carbon will achieve four goals. First, it will provide signals to consumers about what goods and services are high-carbon ones and should therefore be used more sparingly. Second, it will provide signals to producers about which inputs use more carbon (such as coal and oil) and which use less or none (such as natural gas or nuclear power), thereby inducing firms to substitute low-carbon inputs. Third, it will give market incentives for inventors and innovators to develop and introduce low-carbon

products and processes that can replace the current generation of technologies. Fourth, and most important, a high carbon price will economize on the information that is required to do all three of these tasks. Through the market mechanism, a high carbon price will raise the price of products according to their carbon content. Ethical consumers today, hoping to minimize their “carbon footprint,” have little chance of making an accurate calculation of the relative carbon use in, say, driving 250 miles as compared with flying 250 miles. A harmonized carbon tax would raise the price of a good proportionately to exactly the amount of CO<sub>2</sub> that is emitted in all the stages of production that are involved in producing that good. If 0.01 of a ton of carbon emissions results from the wheat growing and the milling and the trucking and the baking of a loaf of bread, then a tax of \$30 per ton carbon will raise the price of bread by \$0.30. The “carbon footprint” is automatically calculated by the price system. Consumers would still not know how much of the price is due to carbon emissions, but they could make their decisions confident that they are paying for the social cost of their carbon footprint. Nordau’s has suggested, based on the social cost of carbon

emissions, which an optimal price of carbon is around \$30 (US) per ton and will need to increase with inflation. The social cost of carbon is the additional damage caused by an additional ton of carbon emissions. 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 emissions with the incremental benefits of reducing climate damages. If a country wished to impose a carbon tax of \$30 per ton of carbon, this would involve a tax on gasoline of about 9 cents per gallon. Similarly, the tax on coal-generated electricity would be about 1 cent per kWh, or 10 percent of the current retail price. At current levels of carbon emissions in the United States, a tax of \$30 per ton of carbon would generate \$50 billion of revenue per year.

#### VII. DATA ANALYSIS AND INTERPRETATIONS

**A: Factors:** Carbonex, Sensex, Greenex, Oil & Gas, Power & **B :Table:** Sample Values of the factors Carbonex, Sensex, Greenex, Oil & Gas, Power. The data is drawn on MicrosoftExcel sheet for formulating the skewness, kurtosis & Correlation of the above sample value of the factors.

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Date	Carbon Close	Power Close	Oil and Gas Close	Greenex Close	Sensex Close
3-Dec-12	959.49	1993.22	8291.1	1575.62	19305.32
4-Dec-12	962.47	2009.86	8421.52	1579.59	19348.12
5-Dec-12	965.01	2000.62	8483.73	1588.68	19391.86
6-Dec-12	970.65	2024.28	8554.83	1601.79	19486.8
7-Dec-12	966.44	2019.95	8510.77	1596.32	19424.1
10-Dec-12	966.51	2014.87	8449.23	1603.89	19409.69
11-Dec-12	964.8	1993.63	8373.63	1601.38	19387.14
12-Dec-12	963.58	1980.61	8399.3	1591.44	19355.26
13-Dec-12	956.55	1959.26	8405.97	1577.1	19229.26
14-Dec-12	962.21	1954.76	8443.49	1585.22	19317.25
17-Dec-12	960.49	1962.25	8400.86	1590.33	19244.42
18-Dec-12	967.38	1983.38	8383.6	1610.06	19364.75
19-Dec-12	973.54	1992.52	8492.88	1623.23	19476
20-Dec-12	971.52	1981.27	8469.24	1621.88	19453.92
21-Dec-12	959.3	1948.92	8339.71	1597.45	19242
24-Dec-12	960.43	1955.83	8303.63	1603.61	19255.09
26-Dec-12	968.29	1974.49	8370.35	1616.37	19417.46
27-Dec-12	964.13	1969.65	8312.85	1610.66	19323.8
28-Dec-12	969.78	1981.6	8510.52	1614.69	19444.84
31-Dec-12	970.24	1990.91	8518.58	1615.82	19426.71
1-Jan-13	978.9	2009.18	8535.17	1631.32	19580.81
2-Jan-13	986.01	2024.25	8645.53	1643.8	19714.24
3-Jan-13	988.66	2023.16	8763.88	1645.14	19764.78
4-Jan-13	989.62	2032.49	8856.29	1644.84	19784.08
7-Jan-13	986.36	2024.9	8875.45	1640.39	19691.42
8-Jan-13	987.81	2037.68	8850.52	1642.3	19742.52
9-Jan-13	983.89	2020.72	8895.15	1633.84	19666.59
10-Jan-13	982.96	2001.95	8936.87	1626.55	19663.55
11-Jan-13	978.72	1967.58	8788.06	1622.63	19663.64
14-Jan-13	991.31	1986.51	8926.95	1637.39	19906.41
15-Jan-13	995.77	1988.75	8965.73	1649.21	19986.82
16-Jan-13	986.1	1969.48	9003.99	1629.79	19817.63
17-Jan-13	992.71	1973.6	9283.79	1634.65	19964.03
18-Jan-13	995.63	2001.97	9571.03	1635.8	20039.04
21-Jan-13	998.79	2016.89	9696.31	1642.7	20101.82
22-Jan-13	991.98	2005.14	9637.3	1630.47	19981.57
23-Jan-13	991.53	1999.34	9586.27	1631.77	20026.61
24-Jan-13	983.15	1959.89	9499.14	1615.78	19923.78
25-Jan-13	994.02	1977.87	9535.84	1633.33	20103.53
28-Jan-13	994.64	1967.49	9426.87	1635.57	20103.35
29-Jan-13	989.6	1955.75	9299.47	1625.42	19990.9
30-Jan-13	990.58	1942.38	9398.26	1623.81	20005
31-Jan-13	989.19	1951.22	9359.16	1618.5	19894.98
1-Feb-13	984.82	1952.43	9374.93	1607.76	19781.19
4-Feb-13	980.65	1925.95	9269.7	1604.45	19751.19
5-Feb-13	976.38	1911.56	9209.68	1596.45	19659.82
6-Feb-13	977.31	1902.15	9192.98	1595.32	19639.72
7-Feb-13	973.1	1875.71	9120.99	1581.57	19580.32
8-Feb-13	966.46	1869.39	9016.73	1569.12	19484.77
11-Feb-13	965.64	1874.76	9000.15	1570.7	19460.57
12-Feb-13	969.17	1869.5	9137.27	1576.13	19561.04
13-Feb-13	968.86	1840.31	9148.29	1572.49	19608.08
14-Feb-13	961.57	1817.28	9002.9	1561.38	19497.18
15-Feb-13	960.79	1817.21	8928.35	1559.83	19468.15
18-Feb-13	962.97	1835.89	8925.24	1566.14	19501.08
19-Feb-13	970.96	1857.15	9016.85	1578.42	19635.72
20-Feb-13	970.89	1850.68	9170.01	1572.49	19642.75
21-Feb-13	954.29	1823.92	9007.41	1547.87	19325.36
22-Feb-13	955.21	1828.17	9059.97	1548.04	19317.01
25-Feb-13	954.2	1827.12	8964.79	1547.54	19331.69
26-Feb-13	939.28	1803.55	8689.98	1522.52	19015.14
27-Feb-13	946.7	1822.32	8792.03	1538.11	19152.41
28-Feb-13	928.85	1744.07	8648.06	1514.78	18861.54

STEP 1 : Open the excel sheet and draw down the table with the given data.

STEP 2 : Click on formula option which is given on the menu bar.

STEP 3 : Click on the insert function and choose the category statistical and click skew & Then click ok.

STEP 4: Select the first number and the last number of carbon.

STEP 5: Select the first number and the last number of power.

STEP 6: Select the first number and the last number of Oil and gas.

STEP 7: Select the first number and the last number of greenex.

STEP 8: Select the first number and the last number of sensex.

KURTOSIS & CORRELATION: For Kurtosis & Correlation value follow the same procedure.

RESULT - SKEWNESS: 0.019989, KURTOSIS: -2.01806, CORRELATION: 0.876566.

**INTERPRETATION: Skewness:** Skewness is less than 1, this analysis shows that oil & gas rightly skewed the value is below the symmetric value.

**Kurtosis:** kurtosis's base value is 3, and we got less than 3 so it's affecting the carbon credit.

**Correlation:** If the value is in (0 - 0.3) slightly correlated, (0 -0.7) moderately correlated, (0.7- 1) strongly correlated. In this correlation its 0.87 it means carbon credit is strongly correlated.

**FINDINGS:** India carbonic is adopted by BSE through London SE in the year 2010. In the carbon emission business we are in a national stage. Most of the investors in carbonex market investing in equity. But this segment is also growing very fast compared to other segment in the secondary market.

#### VII. RECOMMENDATIONS

To create awareness among the citizen on how to reduce the carbon emission or to save the ecological system

1. There is need to improve the regulatory system the Kyoto protocol to the UNFCCC to reduce the emission of greenhouse gases.
2. In India only industries are utilizing the carbon credit revenues whereas other sectors are not utilizing the carbon credit market to make revenues. I suggest government should take proactive steps to include the other sectors like deforestation, agriculture, natural resource mining, and household Emission.

3. There is a need to adopt the ultra modern technologies through which industries can reduce carbon emission without compromising on their growth.
4. Regulation and exchange need to create awareness about the carbon credits to the investor's fraternity. India is gaining 32% shares on carbon emission in the world, but the Indian investors (equity) are not aware about the carbon trading system.
5. In carbon credit \$ 4 billion worth of market .In the coming global years it is expected to touch \$ 100 billion. So there is a wide scope for the investment to create the wealth.

#### CONCLUSION

There are some economical factors like IIP, oil and gas, power and population etc. are influencing the factors before taking a decision to enter this segment. There is scope for the further research to analyze the various economic factors which influence the carbon emission values. So that investor should take informed decision for its future investment in this segment.

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