

# A STUDY ON CARBON MARKET IN INTERNATIONAL SCENARIO

Dr. S. Beulah Mabel,  
Faculty of Business Administration, and Ms. Sindhuja,  
Student of Business Administration, Lady Doak College, Madurai -02

## ABSTRACT:

Global warming has become an issue more and more serious to the world with its effects being experienced by common man all over the globe. The alarming rise in this effect has also called for various attempts to combat it on a global level. One such attempt to combat global warming is the introduction of carbon trading through carbon markets. This paper attempts at understanding the mechanism of the model of carbon trading and analyse it for its various advantages and disadvantages. The disadvantages thus realised would be scrutinised for further clarity into what the actual problem is, thereby, getting a direction on what must be the features of an effective model to combat climate change. The knowledge gained in this regard would then be used to propose a model that can overcome the limitations of the models that already exist. The research methodology employed is Applied research. Applied researches are often carried on a large scale incurring a lot of expenses aimed at solving modern world problems. All the information aiding this paper are secondary in nature and this paper is addressing the issue of climate change on the grounds of business structure (economic solutions). Study into the carbon trading model has found that the model is susceptible to frauds and it might not serve as an effective model to combat climate change.

## ACADEMIC PAPER:

### INTRODUCTION:

Global warming caused by the rising levels of the greenhouse gas emissions has been a concern and an issue demanding the attention of the whole world. This is because it has become a global problem affecting every part of the world and caused by the whole world on different scales, in its attempt toward development at the expense of the environment. Nations and many civil societies have tried their hand at bringing attention to the issue and encouraging individuals and institutions to adopt environment friendly and sustainable practices. However, the effects of global warming became more and more evident by increasing global temperatures, changing precipitation pattern, more droughts, heat waves and strong intense hurricanes. The effects are also seen in many subtle yet alarming ways like rising sea levels etc. These alarming effects demanded the world to come up with a much more effective solution to the problem of global warming. This is where economic solutions gained attention as it would be much more structured and incentivized to reduce carbon emissions and other greenhouse gases rather than appealing to the moral responsibility of people to take action themselves. Incorporating an economic solution to counter climate change was the Kyoto protocol.

### OPERATIONAL DEFINITION:

1. Carbon market: The United Nations Framework Convention on climate change briefs carbon market as follows, Emissions trading as set out in Article 17 of the Kyoto protocol, allows countries that have emission units to spare – emissions permitted them but not “used” – to sell their excess capacity to countries that are over their targets. Thus, a new commodity was created in the form of emission reductions or removals. Since Carbon dioxide is the principal greenhouse gas, people speak simply of trading carbon. Carbon is now tracked and traded like any other commodity. This is known as the carbon market.

2. Kyoto protocol: The United Nations framework convention on climate change is the agreement popularly in effect to fight global climate change and as of June 2013, 92 parties signed to the Kyoto protocol. The first commitment period of the Kyoto protocol was from 2005

– 2012. The united states did not ratify the first commitment period and Canada ceased to be a member effective 15 December 2012. The first Commitment period was lauded to be successful in its statements that between 1990 and 2012, the Kyoto parties reduced their CO<sub>2</sub> emissions by 12.5% which is well beyond the 2012 target of 4.7% (only CO<sub>2</sub> including Canada). This led to the extension of the protocol and a second commitment period was established with new commitments for the period 2013 – 2020. As of September 2017, only 83 states have accepted this amendment.

The above briefing might make us curious on how the economic solution of trading carbon as a commodity actually works. They are traded under different schemes in the following ways,

- Cap and trade
- A removal unit (RMU) based on activities such as reforestation
- An emission reduction unit (ERU) generated by a joint implementation project (earning carbon credits from an emission – reduction or emission removal project in Annex B Party)
- A Certified emissions reduction (CER) generated from clean development mechanism project activity in developing countries.

Though the reduction in carbon emissions by the first commitment period is attributed to the Kyoto protocol, the Kyoto protocol is widely speculated to be a failure on various fronts. Arguments exist that the reduction in carbon emissions was not because of the Kyoto protocol but the various efforts undertaken in the national level for combating climate change even before the Kyoto protocol was agreed upon. Allegations of net increase in carbon emissions, corrupt practices and ineffective policy have also surfaced.

#### **Objectives of the academic paper:**

The main objective of the academic paper is to propose a policy that is economical in nature as is the Kyoto protocol, laying emphasis on practicality and to overcome the below stated limitations of the Kyoto protocol.

#### **Implications of the kyoto protocol:**

The Kyoto protocol would be a perfect solution to tackle climate change provided the following conditions (the conditions are subjective to my analysis, it is not an exhaustive list) hold good,

- The cap or limit set on each country and industry must neither be too high nor too low. If the limit is too high then the industries are allowed to pollute more and if it is too low, Countries might refuse to cooperate.
- The credit market must be closely monitored to ensure that the credits accounted are fair and they have not been intentionally created by increasing emissions and then reducing it to gain incentives.
- The industries emitting large amounts of carbon must take actions to eliminate or reduce carbon emissions rather than just purchasing carbon credits and looking for ways to get through the system in the short run.
- Industries earning credits in emissions reduction unit or through certified emissions reduction must be legitimate in investing in either the Annex B countries or the developing countries respectively and actively reduce carbon emissions.
- The greater the number of countries satisfying the protocol, the greater the effective reduction in carbon emissions. However, it is important to note that the reduction in emission will not be effective despite the participation of many if the major polluters of the world do not commit themselves to action. Hence, the participation of all countries with no exclusion of the major polluters is a must.

As of 2011, the top 10 largest CO<sub>2</sub> emitting countries accounted for almost 67.6% of the world total and the top 10 positions were held by China(27%), U.S(17%), Russia(5%), India(5%), Japan(4%), Germany(2%), Iran(2%), South Korea(2%), Canada(2%), Saudi Arabia (2%). This explains why the participation of at least the top 5 countries is absolutely essential for effective reduction in carbon emissions. The climate change is caused not just by CO<sub>2</sub> but also by other greenhouse gases like Methane, Nitrous Oxide and Chlorofluorocarbons. An inclusion of all the greenhouse gases would be more effective to combat climate change. Any violations to the above conditions can make the model ineffective and even negatively impact climate rather than alleviating the present crisis of climate change.

### **Carbon Trading**

Climate Change is linked to emission of greenhouse gases today. If they are not curbed the effect on society will be devastating. The total carbon emissions in India is estimated to be 1,880 million tonnes and industries in metal, thermal power and transport are the major contributors. Global carbon trading has gained momentum. The Worldwatch Institute has estimated the total value of carbon trade in 2007 at \$59.2 billion. Carbon credit is a mechanism to reduce greenhouse gas emissions by placing a monetary value. A carbon credit gives the owner the right

to emit one tonne of carbon dioxide. Countries, in turn, set quotas on the emissions for the businesses in energy, power, chemicals, fertilizers and cement. Business that overshoot quotas must buy carbon credit for excess emissions. While businesses that are below their quotas can sell their remaining credits. Credits can be bought and sold in international market

### **Correlation of the above with the actual protocol implemented:**

Correlating the above conditions with the actual Kyoto protocol that was implemented in the first commitment period. it is unfortunate to know that some of the above stated conditions have been compromised in some way.

The Stockholm Environment Institute(SEI) wrote in a policy brief that “Overall the use of Joint implementation (JI) may have enabled global GHG emissions to be about 600 million tCO<sub>2e</sub> (tonnes of carbon dioxide equivalent) higher than they would have otherwise been”. This was blamed on the loophole in the Kyoto protocol’s JI mechanism which enabled countries to earn and sell credits which were not real. Further, the carbon market watch stated that, “About three quarter of JI credit may not represent actual emission reductions” but “bogus carbon offsets”. Russia and Ukraine were the main offenders according to the SEI. There is no substantial evidence that countries have undertaken emission reduction or elimination projects on a scale substantial enough to switch to sustainable technologies and go green.

The guardian has also reported that according to David Victor, a leading carbon trading analyst at Stanford university in the US, as many as two-thirds of the supposed “emission reduction” credits being produced by the CD from projects in developing countries are not backed by real reductions in pollution. Further, the protocol allows even new coal plants to apply for offsets just with marginal improvement.

‘A massive 4000 MW coal plant on the coast of Gujarat, India is expected soon to apply for CERS. The plant will spew into the atmosphere 26m tonnes of CO<sub>2</sub> per year for at least 25 years. It will be India’s third and the world’s 16<sup>th</sup> largest source of CO<sub>2</sub> emissions’, reported Guardian. This is like adding emissions and then incentivizing to reduce it rather than reducing emissions from its current level.

The most unfortunate limitation of the Kyoto protocol is that not all the top 10 emitters of CO<sub>2</sub> have either ratified the protocol or are under the obligation to participate in it. The protocol excludes the developing nations from implementing the protocol to not pose an hindrance to its economic development and this excludes China and India which are the first and the fourth most emitter of CO<sub>2</sub>. The United States being the second largest

emitter of CO<sub>2</sub> never ratified the protocol. This means that about 49% [China(27%) + US(17%) + India(5%)] of the CO<sub>2</sub> emissions are not under the obligation for reduction and the target of a percentage of reduction in CO<sub>2</sub> applied only to the other 51% of the emissions. Further the sector of international and domestic civil aviation and maritime transport (4.2% of the CO<sub>2</sub> emission) has been left out of the Kyoto protocol as the targets for it cannot be set under any particular country. Its percentage share of 4.2% might seem a small proportion in contrast to the 49% that has been left out, but it still poses an alarming threat because the emissions are expected to grow between 50 and 250 percent by 2050, reported the grist.

In the efforts towards tackling climate change, the effect of all greenhouse gases in global warming must be duly considered and addressed. However, the Kyoto protocol lays its main emphasis only on the CO<sub>2</sub> emissions, which is only one of the many causes of climate change. Further, the result of the Kyoto protocol is limited only to the CO<sub>2</sub> emissions and tells us nothing about the emission levels of other greenhouse gases.

Finally, the analysis into the percentage fall in CO<sub>2</sub> emissions by the guardian is disappointing rather than calling for celebrations for the 12.5% reduction in CO<sub>2</sub> emissions achieved by the Kyoto parties. It was reported that the world saw its CO<sub>2</sub> emissions rise by about 11% in the period 1990 to 2011. This contradiction is because of the increased emissions by China and other emerging economies with China's emissions increased by about 7% in the same period. These limitations on the Kyoto protocol has raised questions on if the same protocol should be further extended. However, the second commitment period has already been agreed upon for the period of 2013-2020 and as of September 2017 only 83 countries have agreed upon the commitment. Some of the countries that are not part of the second commitment period are United States, Canada, Japan, Russia and New Zealand. This list of developed nations not being a part of the second commitment period weakens the protocol inherently and the limitations of the first commitment period could repeat itself.

#### **An alternate model to combat climate change:**

The model proposed in this paper to tackle climate change has relevance to that of a share market in terms of its functionalism. The basic idea is that, any entity that contributes to the issue of climate change by emitting greenhouse gases is not unaware of the dangers posed by it and is also not against adopting sustainable development by reducing the release of greenhouse gases. However, what stops these entities from doing so is the huge investments that goes into shifting to sustainable energy sources. This factor of huge investment needed is what made Kyoto protocol exclude developing nations from participating in the emissions reduction goals as it might affect their growing economy to shoulder such huge costs. To address this, the same concept of raising equity funds to meet the capital needs of a company can be followed, i.e., the share market. The budget needed for transition to sustainable energy source, production or any other system, to eliminate or decimate the emission of greenhouse gases can be sold as shares of the particular project in a share market set up to handle these shares. The next big question to address would be, what would be the dividends paid for these shares purchased. If the units of greenhouse gases that were prevented from being emitted because of the investments made possible by these shares were to be attributed a cost and the same were to be given as dividends, the model would still place a high pressure on the entity selling the shares hoping to eliminate or reduce emissions as setting the cost itself is an ambiguous process. Hence, the dividends should be calculated in terms of the amount of money the entity need not spend in running a system (Ex:

Buying coal to power its processes) that was just replaced by the investments made possible through these shares.

The following is an **illustration of the model implementation** :

Average household consumption of electricity in Washington = 12,444KWh annually,

Average electricity bill in Washington = \$1056

Energy that can be produced in Washington by a 12KW solar energy system = 13,071KWh

Average cost of 12 KWh solar energy system in Washington = \$31,422

Assume the \$31,422 is divided into six shares, each worth \$5,237. Dividing the average electricity bill among the six shares, each share can be paid a dividend of \$176 which is 238% more than the interest that can be earned from depositing \$5,237 in a bank in Washington at an interest rate for deposits at 1%. This investment is clearly a gain for the shareholders in relation to depositing their funds in the bank.

The question to be addressed in this context is how long the shares will be paid dividends for. It cannot be forever as it reduces the likeliness that the company would implement this model. Each share must be given an acquisition period at the time of its sale. The acquisition period for each share depends on the entity's ability to acquire the shares. If the entity will be able to buy a share worth \$5,237 in five years, then the acquisition period of each share would be in an interval of 5 years. However, if it can purchase all the shares in just 5 years-time, the entity can do that as well. Thus, the entity will acquire all the shares in a given period of time finally owning the investment. The most important as regards the acquisition period is that the entity selling the shares must clearly write down in the contract that the share would be acquired in a particular period. The entity cannot freely decide at its own will when it would purchase the share after the share is sold as it would make the investors uncertain about the gain that they could get from purchasing the share. An investor who wishes to get dividends for just 5 years can purchase the share that will be acquired in just 5 years and those who wish for dividends over longer periods can buy the respective shares.

The above illustration is the simplest form of the perfect condition under which the model can operate. However, there are cases when there could be no motivation to invest in these shares as a result of higher interest rates prevailing in a country on bank deposits or the entity with a project is unwilling to put up shares, simply because the investment needed is too little to go through all this trouble of selling it as shares despite its inability to afford the small investment. In cases where the interest rates on bank deposits are high, the local public might not make the investment but the shares can be bought by those who work towards tackling climate change and by anyone on moral grounds. Even foreign funds must be allowed to purchase these shares in the lights of a good cause. To ensure that there is no complication in this, the foreign funds that are to be invested in these shares must have ease of crossing borders to make the investment more attractive and easier. The regulatory factors also play an important role in this (the importance of regulatory factors will be covered later). In the next case, where the investment is too small, investments of such nature can be aggregated and shares can be sold under a single entity's control. This entity can be a middleman. Again, the role of regulatory mechanism would play a major role in ensuring this happens without any sort of fraudulent practices.

Another implication with the given illustration is that it explains only in terms of solar energy. Solar energy is not the only form of renewable energy but it is the energy that can be harvested in any scale, ranging even from 1000 KWh annually. Further, there's also the production of energy by burning fossil fuels that contribute to global warming. Thus, it is essential that even the producers of energy must implement the model and shift to renewable energy sources. If this is achieved then it is more like addressing the problem from the roots whereby the emissions are substantially brought down right from the emissions involved in the production of energy and in terms of domestic and non-polluting industrial uses. However, there's a case in which the producers of energy might oppose the model. This could happen if the model happens to be successful and most domestic and industrial units invest in their own energy production. However, it must be recognised that not all users would want to invest in their own energy production. Example: A flexible industrial plant that keeps changing its location of operation might not necessarily invest in producing its own energy. Thus, not all demand for energy is going to be lost. Further, this is just like an upgradation in processes. Just like the fact that all industries face a period where they have to undergo a drastic change and suit itself to the change, these entities (energy producers) might have to find a role for themselves in the carbon market for tackling climate change.

The illustration explained in the simplest form must hold good even for industries that consume power on large scale as a large unit is just an aggregate of several smaller units. However, this paper will not be able to prove it

empirically due to its limitation of obtaining data. The last is the important role of the regulatory mechanisms. Any model that can breed fraudulent activities is bound to fail sooner or later, hence the regulatory factors must have complete information on each and every share sold and in what projects the investment get into.

In case of several small investment requirements aggregated and sold as shares under a single entity (a middleman), the regulatory factor must have complete information and control over the middleman. This can be done in the form of formal licensing and framing a strict framework for the governance of the carbon market. The regulatory factor must be global in nature and must be able to work across borders with no hindrances. It must not work to any entity's advantage and it must be solely committed to the purpose of elimination or reduction in the emission of greenhouse gases. Emphasis must be laid on how the shares are divided, the value of the shares that would be optimal in every country provided the cost of solar panels, the power charge in a country, it's currency, the dividend promised for each share and the acquisition period.

#### **Objectives of this model:**

Frame a solution to tackle climate change that works on economic incentives to finance the investments needed in shifting to sustainable energy Use the Kyoto protocol as the major foundation to understand its implementation process, the institution that was framed through it, it's functionality and its limitations to tackle climate change, to overcome those limitations in the model proposed and making it effective.

#### **Advantages of the model proposed:**

It can aid in the elimination efforts of greenhouse gases rather than just a percentage reduction. There is no incentive for industries to raise its emissions and then reduce it. It addresses not just the reduction or elimination of carbon emissions but all factors that contribute to global warming provided they can be addressed by investments in shifting to sustainable ways.

All countries irrespective of economic stage of growth can participate as the burden is dissipated according to the entity's convenience and ratification by countries might not even be needed provided the industries are willing to oblige and proper dialogue takes place in ensuring nations would leave the decision of adopting the model to the discretion of the entities (households, factories, industries, energy producers, etc.,)

The countries might not necessarily incur any expenses as all the carbon markets set up will be global in nature and under the formulation of international organisations working to tackle climate change as the primary goal. Given, the effective implementation of the Kyoto protocol despite its complex mechanisms of calculating external costs of carbon, this model must be easier in application.

#### **Scope for further study of the model proposed:**

The following are the key points on which further study can be made to enhance the proposed model, The model has been proposed and illustrated based on the secondary data collected. No primary data has been collected to support this model and prove it empirically. The illustration was possible only on a very small scale and it hypothesized to hold good even for application on a large scale based on the fact that a large unit is an aggregate of several small units and thus the model must hold good on a large scale provided it works in the small scale.

The economic structure that the carbon market is based on is the share market. However, the one main difference between the two is that the shareholders will face a restraint in trading the shares as the dividends paid on it are fixed until it is finally acquired by the entity that sold the shares, making the shares incapable of any raise in its value.

**Conclusion:**

Climate change has become a problem vital enough to be discussed in global forums. Despite the interest of various countries to combat climate change, achieving positive results in that regard is still a dream to come true. The main factor that hinders nations from combating climate change is the huge investments that are to be made to shift to cleaner energies or adopt any policy that controls the level of greenhouse gases emitted. Thus, any policy aimed at reducing the level of greenhouse gases and combating climate change must be functional and economical in nature. If the problem of finance is taken care of, then every nation can effectively act to reduce greenhouse gases irrespective of developing or developed nation.

**Reference:**

BBC News. (2018). *Carbon trading: How does it work?* . [online] Available at: <http://www.bbc.com/news/science-environment-34356604> [Accessed 6 Jan. 2018].

Circular Ecology. (2018). *The Kyoto Protocol: Climate Change Success or Global Warming Failure?* . [online] Available at: <http://www.circularecology.com/news/the-kyoto-protocol-climate-change-success-or-global-warming-failure> [Accessed 6 Jan. 2018].

Electricity Local. (2018). *Washington Electricity Rates* . [online] Available at: <https://www.electricitylocal.com/states/washington/> [Accessed 16 Jan. 2018].

En.wikipedia.org. (2018). *Carbon* . [online] Available at: [https://en.wikipedia.org/wiki/Carbon\\_](https://en.wikipedia.org/wiki/Carbon_) [Accessed 6 Jan. 2018].

En.wikipedia.org. (2018). *Kyoto Protocol* . [online] Available at: [https://en.wikipedia.org/wiki/Kyoto\\_Protocol](https://en.wikipedia.org/wiki/Kyoto_Protocol) [Accessed 6 Jan. 2018].

En.wikipedia.org. (2018). *List of parties to the Kyoto Protocol* . [online] Available at: [https://en.wikipedia.org/wiki/List\\_of\\_parties\\_to\\_the\\_Kyoto\\_Protocol](https://en.wikipedia.org/wiki/List_of_parties_to_the_Kyoto_Protocol) [Accessed 6 Jan. 2018].

Environmental Defense Fund. (2018). *The world's carbon markets* . [online] Available at: <https://www.edf.org/worlds-carbon-markets> [Accessed 6 Jan. 2018].

Garden, H., Science, E. and Science, G. (2018). *How Carbon Trading Works* . [online] HowStuffWorks. Available at: <http://science.howstuffworks.com/environmental/green-science/carbon-trading.htm> [Accessed 6 Jan. 2018].

Goldstandard.org. (2018). *CARBON PRICING: What is a carbon credit worth? | The Gold Standard* . [online] Available at: <https://www.goldstandard.org/blog-item/carbon-pricing-what-carbon-credit-worth> [Accessed 6 Jan. 2018].

Greenchipstocks.com. (2018). *Carbon Trading: The World's Next Biggest Market* . [online] Available at: <http://www.greenchipstocks.com/report/carbon-trading-the-worlds-next-biggest-market/107> [Accessed 6 Jan. 2018].

Ieta.org. (2018). *The World's Carbon Markets* . [online] Available at: <http://www.ieta.org/The-Worlds-Carbon-Markets> [Accessed 6 Jan. 2018].

Jackson, R. (2018). *Global Climate Change: Effects* . [online] Climate Change: Vital Signs of the Planet. Available at: <https://climate.nasa.gov/effects/> [Accessed 6 Jan. 2018].

Lexicon.ft.com. (2018). *Cap And Trade Definition from Financial Times Lexicon* . [online] Available at: <http://lexicon.ft.com/Term?term=cap-and-trade> [Accessed 6 Jan. 2018].

Lexicon.ft.com. (2018). *Cap And Trade Definition from Financial Times Lexicon* . [online] Available at: <http://lexicon.ft.com/Term?term=cap-and-trade> [Accessed 6 Jan. 2018].

Lexicon.ft.com. (2018). *Carbon Market Definition from Financial Times Lexicon* . [online] Available at: <http://lexicon.ft.com/Term?term=carbon-market> [Accessed 6 Jan. 2018].

Matasci, S. (2018). *How Much Does a 12kW Solar System Cost? | EnergySage* . [online] EnergySage Solar News Feed. Available at: <https://news.energysage.com/12-kw-solar-system-cost/> [Accessed 16 Jan. 2018].

News.bbc.co.uk. (2018). *BBC News - Who pays and who gains from carbon offsetting?* . [online] Available at: <http://news.bbc.co.uk/2/hi/business/8378592.stm> [Accessed 6 Jan. 2018].

the Guardian. (2018). *Why are carbon markets failing?* . [online] Available at: <https://www.theguardian.com/sustainable-business/blog/why-are-carbon-markets-failing> [Accessed 6 Jan. 2018].

