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Carbon Credits: A Step towards Clean and Safe Environment

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ABSTRACT

One of the factors causing climate change is global warming. Global temperatures rise because the greenhouse gases in the atmosphere carbon dioxide, water vapor, nitrous oxide, methane, and ozone trap heat and light from the sun. This has an effect on lots of people, animals, plants, and the environment. A certificate or authorization for the emission of one tonne of carbon dioxide or an equivalent amount of another greenhouse gas is known as a carbon credit. Thanks to carbon credits, global warming-causing GHG emissions have been successfully reduced (also known as carbon offsets). It helps to reduce emissions of CO_2 or GHG. It may be used to modify the climate and protect environmental issues including halting deforestation, agriculture, and sanitization, renewable energy sources, improving green technologies and boosting the economy of underdeveloped countries. Burning fossil fuels contributes significantly to greenhouse gas emissions, especially in the steel, cement, textile, and fertilizer industries (coal, electricity derived from coal, natural gas and oil). People's growing awareness of how crucial it is to reduce emissions gave rise to the concept of carbon credits.

Keywords : Carbon Credits, Environment, Pollution, Textile Industry

INTRODUCTION

The temperature of the planet changes during the day. This is caused, in part, by global warming. Global warming is the cause of Earth's warming (the temperature rises). Due to greenhouse gases' ability to trap solar heat and light, the earth's atmosphere warms (carbon dioxide, water vapour, nitrous oxide, methane, and ozone). This has an influence on many of people, animals, plants, and the environment. Seasons, landscapes, sea levels, the likelihood of drought and flooding, the strength of storms, and the number of diseases and illnesses linked to the heat are all changing at this time (Sharma, 2013; Shende and Jadhao, 2014). Thanks to carbon credits, global warming-causing GHG emissions have been successfully reduced (also known as carbon offsets). Carbon credits, also known as certified emission reductions, can be used by organizations, governments, and individuals as a certificate to offset the harmful carbon emissions they are generating. For each carbon credit, one ton of CO_2 is removed from the atmosphere or prevented from being emitted (http://www.textilevaluechain.com; Courchene and Allan, 2008).

Carbon credits, an offspring of the Kyoto Protocol, are regarded as the emission of one ton of carbon dioxide or other related greenhouse gases. It helps to reduce emissions of CO_2 or GHG. Economics, which offers a framework for global climate change and the carbon trading business, must be included in order to control global warming in addition to science (Yakkaldevi, 2015).

According to 'The Environment Protection Authority of Victoria' defines a carbon credit as a "*generic term to assign a value to a reduction or offset of greenhouse gas emissions. Usually equivalent to one tonne of carbon dioxide*" (Systain, 2010; Swenson, 2014).

Carbon footprint is defined as "the total set of greenhouse gas emissions caused by an individual,

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event, organisation and product (Sachdev, 2013; Swenson, 2014).

It's common to express the total greenhouse gas emissions brought on by human activity in terms of equivalent tons of carbon dioxide (CO_2) (Hussain,).

Carbon Offset Credits (COC's):

Examples of sustainable energy sources that are included in carbon offset credits include wind, solar, hydropower, and biofuels.

Carbon Reduction Credits:

Carbon reduction credits are created via the activities of reforestation, forestation, ocean and soil capture and storage of carbon from our atmosphere.

Role of Carbon Credits in Textile Industry:

The textile industry is quite large and produces a lot of pollution. Chemicals and water are two resources that the textile industry uses extensively. The textile industry is the primary cause of water pollution in the globe. In textile production facilities, chemical applications are employed on the fibers or fabric during wet treatments including designing, prewashing, mercerizing, dyeing, printing, etc. Every step of the fabric-making process needs water, first to dissolve the chemicals that will be used in that phase and then to wash and rinse those same chemicals to get them ready for the next. Some fibers need to be bleached with chlorine before being dyed. As a result, very dangerous oregano chlorine compounds are released into the air. Chemicals account for 10% to 100% of the fabric's weight in manufacture. From dyes to transfer agents, the textile industry employs more than 2000 different kinds of chemicals (Reddy and Suvikram, 2010).

The industrial sector is responsible for 60–70% of CO_2 emissions. The textile industry contributes to environmental degradation. India is fourth in the world in terms of total emissions, after China, the US, and Russia. In terms of CO_2 emissions, the textile industry in the US is ranked sixth internationally. Each year, the global textile industry generates 60 billion kg of fabric and is responsible for the creation of carbon emissions through the operations of dyeing, bleaching, and finishing. An estimated 9 trillion gallons of water are used in the activities each year, and 132 million metric tons of coal is burned. The textile sector has raised significant environmental issues. However, it is anticipated that 18.12 million tons of emissions will be generated by the textile industry in India (Anonymous, 2012).

About 9–10% of the total energy in India is used by the textile industry, which accounts for 20% of all manufacturing costs. The thermal and electrical energy required by the Indian textile industry is produced by burning fossil fuels (like coal, firewood, fuel oil). When fossil fuels are burned, carbon dioxide is emitted. The use of chemicals, solvents, and a lot of water during the manufacture of textiles also has a substantial detrimental influence on the environment. Furthermore, because some of the organic bromine contained in some flame retardants used in textiles is difficult to decompose in the environment, it harms the ecosystem. Additionally, azo dyes and formaldehyde used in the production and dyeing of textiles contribute to environmental contamination. The greatest method to reduce these GHGs is to adopt environmentally friendly technologies. The consumer consumption phase accounted for 58% of the total GHG emissions from a pair of Levi's 501 jeans. The production of textiles accounted for 21% of the remaining emissions, followed by cut-sew-finish clothing (9%), logistics and retail (6%), and end-of-life (1%) (Strauss *et al.,* 2008).

Textile sector and Environment:

The textile industries have an effect on the environment by emitting carbon dioxide into the atmosphere. A substantial amount of carbon dioxide is produced by the spinning and weaving mills. The major environmental issues that the textile sector faces also include energy consumption, the release of solid waste and effluent, and the emissions of dust, smells, etc. Facilities for the production of textiles can have an influence on the environment. The usage of raw materials and other natural resource inputs like water, as well as the release of effluents or emissions, all contribute to the deterioration of natural resources. The fact that manufacturing processes squander a significant amount of water is well known. The process of creating textiles includes the phases of creating yarn (fiber production, spinning), fabric (weaving and knitting), wet processing (dying, printing, and finishing), and garment fabrication. It is important to note that each stage uses a different amount of water.

Integrated textile mills typically generate 15 tons or less of finished textiles every day. 3,840 cubic meters of water are utilized daily in total, 1,680 of which are needed for processing and finishing, and 960 of which are used

to produce steam. According to Green stratos Consulting, several persistent organic bromine compounds are also employed as flame retardants in particular textiles (break down very slowly in the environment). Additionally, the textile sector makes use of illegal substances including formaldehyde and azo dyes. We can fully comprehend the pollution produced at each stage of the textile manufacturing process if we are aware of all the processes and sources that contribute to CO_2 emissions.

Process	Source	Pollutants
Energy Production	Boiler	Nitrous oxide, sulphur dioxide
Coating, drying and curing	Ovens, Dryer	Organic chemicals
Cotton handling activities	Carding, Combing	particulates
Sizing	Sizing process	Nitrous oxide, sulphur dioxide
Bleaching	Bleaching process	Chlorine, chlorine compound
Dyeing	Dyeing chemicals	H2S, Aniline
Printing	Printing process	Ammonia, HC
Finishing	Finishing process	Lubricants, formaldehyde
Chemical storage	Storage tank	Volatile chemicals
Waste water treatment		Toxic emission, non decomposable

This growth in carbon dioxide pollution has caused the atmosphere's global temperature to rise. The use of modern technology and the growth of industry are the major causes of these climate changes, however there are additional causes than carbon dioxide. The major cause of the observed temperature rise since the 20th century is the concentration of greenhouse gases, which is growing as a result of human activity like burning fossil fuels and deforestation.

Contribution of Carbon Dioxide in GHGs:

Carbon Dioxide (CO_2)	77%
Methane (CH_4)	14%
Nitrous oxide (N_2O)	8%
CFC gases	1%

Factors behind Textile CO_2 Emissions in Textile Industry:

The great majority of produced synthetic fibers contribute to the textile industry's detrimental impact on the environment for a number of different reasons. These materials need a tremendous amount of energy to manufacture, such as nylon and polyester manufactured from petrochemicals and rayon treated with chemicals, but the chemicals required to generate them end up as pollutants that damage the air, land, and water. Conventional cotton production is tremendously detrimental to the environment and makes up the second-largest portion of all fibers produced globally. Cotton cultivation requires extensive use of insecticides, water, and chemical fertilizers (Reddy and Suvikram, 2010).

Cotton manufacturing also consumes a significant amount of energy and chemicals. Clothing is dyed and bleached using chemicals, energy, and a lot of water. Chemical dyes are used in about one million tons annually. Water and energy are important requirements for wet finishing (Mehta and Goyal, 2015). It was shown that cotton cultivated organically in India has a greater embodied energy than cotton grown conventionally in the USA since yields in India are much lower, more land is required to grow the same amount, and a sizable share of India's energy is provided by coal (Kaur *et al.,* 2012). Observed that the development of carbon footprints was a global issue that could only be solved by global efforts. In order to achieve a sustainable future for a cleaner and greener world, the textile sector should thus vigorously adhere to the ideals of the Clean Development Mechanism along the whole value chain.

Steps to Control Green House Gases in Textile Units:

The best way to reduce GHG emissions is to use environmentally friendly technologies and a sustainable development approach.

Examples of sustainable technology that might be used in the textile industry's sector include the following:

Spinning Unit:

- Installation of automatic power factor correction system with capacitors
- Replacement of old energy-inefficient transformers with energy efficient ones
- Replacement of energy-inefficient motors with energy-efficient ones (For ring frames and open end spinning machines)
- Installation of photocells for speed frames;
- Installation of synthetic flat belts for spinning ring frames;

- Installation of energy-efficient lighting system (in place of conventional lighting)
- Installation of energy-efficient fans for humidification plants
- AC variable frequency drive for fans of humidification plants–Diesel engine operated captive power plant

Weaving Unit:

- Adaptation of V-belt drives to flat belt drives;
- Substitution of standard motors with energy-efficient ones
- Fixing of energy-efficient lighting system (in place of conventional lighting)
- Installation of energy-efficient fans for humidification plants
- Use of electronic ballast in place of conventional electromagnetic chokes.

Wet Processing Unit:

- Replace conventional rapid jet dyeing machine with low liquor ratio jet dyeing machine
- Replace steam dryer with RF dryer for dyeing yarn
- Replace inefficient boilers with coal-fired water tube boiler with bag filter
- Replace ordinary submersible pump with an energy-efficient one
- Additional fourth effect caustic recovery plant
- Naphtha-based gas turbine with waste heat recovery boiler (cogeneration)
- Monitoring for heat recovery potentials
- Recovery and reuse of waste water in fabric dyeing

Carbon Neutral Products:

- Carbon neutrality is nothing new in the textile and garment sector, which indirectly increases carbon dioxide emissions. The textile industry and players along the value chain have taken a number of actions to reduce carbon footprints.
- The well-known US chemical corporation DuPont sells Sorona, which reduces greenhouse gas emissions by 63% when compared to conventional nylon made from petroleum. Sorona is a polymer that is made from agricultural feedstocks rather than petrochemicals and contains a high proportion of renewable components (37% by weight). Fabrics made with Sorona minimize carbon dioxide by 30% throughout the production process.
- The Anvil Recycled t-shirt is a state-of-the-art, reasonably priced product that has less of an impact on the environment, reuses residual materials that most textile producers regard to be rubbish, and does not require dyeing to save a significant amount of energy and resources. The Anvil Recycled t-shirt has received certification as Carbon Free from Carbonfund.org, the leading non profit producer of carbon offsets and climate solutions (Grace, 2009). *(Source: compiled from journal of scientific and Industrial research article, www.nopr.niscair.res.in)*.

Some Innovative products with smaller carbon footprints are:

- When compared to standard nylon derived from petroleum, polymer fiber generated from agricultural feed stocks offers a 30% CO reduction while its production process cuts GHG emissions by 63%.
- Fiber goods made of polymers that have increased dye ability and other qualities.
- A technique for bleaching that can save water and energy use by up to 40% while reducing cotton loss by 50%.
- When compared to the standard method, the after soaping agent for dyeing may shorten processing times and use less water.
- The cutting-edge air method for dyeing uses one-fourth the water and uses less energy and chemicals.
- Why By employing ink derived from dyes instead of toxic salts and using digital printing, which leaves a substantially smaller environmental imprint, neither fabric nor ink is wasted.
- A formaldehyde-free pigment printing technology, which guarantees "zero addition" of formaldehyde during production and requires no further processing.
- Color Fast Finish is a textile finishing technique that requires just one step, cutting down on processing time and CO_2 emissions.
- Fluorocarbon coatings based on C6 that resist and release stains.

- Cutting-edge equipment that uses foam to apply coatings to textiles while saving water
- To eliminate impurities from fibers or fabrics, industrial enzymes, which are essentially proteins, take the place of harsh chemicals. This lowers energy costs, water usage, and also enhances the feel of the fabric (http:// www.indiantextilejournal.com; http:// blog.mbaco.com).

Role of India in Carbon Trading:

India is beginning to play a substantial role in the global market for carbon credits. Although the market for carbon credits is now expanding quickly, especially in India, just a small number of firms are aware of it. At the moment, raising awareness of this sector is quite vital. India's GHG emissions are below the target, hence it is permitted to sell extra credits to developed countries. India is thought to be responsible for 31% of worldwide carbon trading. This makes trading in carbon credits a tremendous economic prospect. Foreign companies who are unable to follow the regulations could buy extra credit from global companies. The stock ratings of several Indian firms have been updated in light of the windfall that will come their way once carbon trading starts. There are agreements in existence between Shell Trading International and SRF Ltd for the selling and buying of credit for decreasing emissions. Both Suzlon Energy and Shriram EPC are involved in the wind energy industry and are eligible to profit from carbon credit advantages. Shree Renuka Sugars is also predicted to benefit from carbon credits (http://dictionary.sensagent.com; https:// en.wikipedia.org).

Gujarat Flour Chemicals was one of the first companies to sign up for a Clean Development Mechanism (CDM) project. India is the underdog in this contest since more than 200 Indian organizations have applied to register their CDM Project in order to get carbon credits. The 800 million farmers in India also have an unique opportunity to gain money by selling carbon credits to developed nations (http:// www.taxnaccounts.com; http://www.indiansugar.com; http://www.mcxindia.com).

India's Delhi Metro Rail Corporation (DMRC), the first rail project in the world to get carbon credits, uses regenerative braking technologies in its train stock. DMRC has accumulated the carbon credits by installing regenerative braking systems on its trains, which reduce power consumption by 30%. The system continues to lessen environmental pollutants as a result (http:// www.textilevaluechain.com).

People should be aware that the market pricing, methodology and registration scheme for the carbon credit industry vary swiftly (Barman, 2015). Everyone should be aware of its impacts and work to prevent any negative ones from harming the environment. It is clear that carbon credits are significant in our everyday lives.

Adoption of Carbon Credits by Textile Industries:

The Nahar Spinning in Punjab has obtained carbon credits for their effort to generate electricity from rice husks. This facility will reduce carbon dioxide emissions by 22000 tons.

Nakoda Textile Industries:

The usage of gas-powered equipment has resulted in significant cost savings and pollution-free power supply.

Ambika Cotton Mills:

This textile business made a net profit of Rs. 9.42 crore (total turnover: Rs. 185.40 crore in 2008-09). More than one-third of its net earnings are derived from carbon credits has set aside Rs. 3.39 crore for the sale of carbon credits obtained from its wind farm in 2008–2009.

Sambandam Spinning Mills:

In comparison to the previous year, its wind energy converters produced power worth Rs. 8.59 crore as opposed to Rs. 8.51 crore. Income from carbon credits was Rs. 1.66 crore, down from Rs. 3.36 crore in 2007-2008.

Kandagiri Spinning Mills:

Its wind energy converters generated power, earned carbon credit income of Rs. 1.28 crore in 2008-09 (Rs. 2.93 crore in 2007-08).

Jayashree Textile:

'Humidification Towers' of Jaya Shree Textiles under CDM.

Arvind Mills:

This textile submitted two CDM projects to UNFCCC on agro-based steam generation (80,000 CER/ Year).

Velatal Spinning Mills Pvt. Ltd.:

This textile implemented 8.75MW capacity wind energy based power plant (CER 67184) (Chakrabarti, 2010).

Other industries are:

- Gupta Exim (Haryana)
- Pratibha Syntex in Pithampura (M P)
- Malwa Industries Limited
- Ludhiana knitwear industry

Sree Santhosh Group Companies (Tamil Nadu):

Rizwan said that when it came to developing nations, India was emerging as a pioneer in the creation of creative carbon trading methods and portfolios. India was advised to develop measures to decrease wastages of any kind, including power (Rizwan, 2012).

The global textile sector has made progress in lowering its carbon footprint and addressing the difficulties of constructing a more sustainable future. Consumers were becoming more conscious of environmental concerns and the need for textile items to meet environmental requirements (Mehta and Goyal, 2015).

India has become a global leader in carbon trading. However, there weren't many lingering questions or ambiguities about this company's future. The future of the carbon trading industry will undoubtedly be bright if nations all over the world understand and realize their responsibilities to maintain a clean environment while also conducting commerce (Bhardwaj, 2013).

Conclusion:

The usage of chemicals in industry, which releases polluting gases like carbon dioxide and methane, is increasing GHGs day by day cause the earth's temperature to rise. For living things, these gases cause pollution concerns. Therefore, it is necessary to lower GHG levels. Carbon credits are one method for reducing this issue. Carbon credits are a type of certificate used to track environmental pollution reduction efforts that reduce greenhouse gas emissions. Chemical-using industries should switch to environmentally friendly fibers, fabrics, and dyes for all operations so that no one is harmed and the environment is kept clean and green. Carbon credits are a way to create pollution-free enterprises. To inform the customer of the financial and environmental advantages of lowering the washing temperature, running a full load, hanging up clothes to dry, and switching to more energy-efficient washers and dryers.

REFERENCES

Anonymous (2012). Carbon Credits: Its Role in the Textile Industry. *Textile Times,* **9** (10).4-10. www.citiindia.com.

Barman, P. (2015). Carbon Trading and World Economy in the 21st Century. *International J. Interdisciplinary Res. Science Society & Culture (IJIRSSC).*, **1**(2) : 167-171.

Bhardwaj, B. (2013). Future of carbon trading: a business that works for Global environment. *International J. Sci., Environment & Technology*, **2**(1) : 115 – 121

Courchene, T. J. and Allan, J.R. (2008). Climate change: The case of carbon tariff/tax. *Policy Options,* **3** : 59–64.

Chakrabarti,S.K. (2010). Carbon credit of jute. *Indian Jute Industries' Research Association,* **2** (4) : 12-15.

Grace, P. (2009). Life Cycle Assessment of 100% Australian T Shirt. Presentation (.ppt) to Climate Change and Cotton R&D Coordination Workshop.

Hussain, S.A. Clean Development Mechanism (CDM) and Government Initiatives for Promotion of CDM Project Activities in Pakistan. Clean Development Mechanism Cell, Ministry of Environment, Government of Pakistan

Kaur, P., Marriya, K. and Kashyap, R. (2012). Carbon Credits: An opportunity for Textile Industry. *The Indian Textile Journal*, **1**(5) : 1-9. Retrived from: http:// www.indiantextilejournal.com/articles.on 12 feb, 2021.

Mehta, R. and Goyal, C. (2015). Role of Carbon Footprint in Textile and Apparel Industry. Pp. 1-4. Parvathamma, E. 2010. Carbon Credits Trading-Young and Emerging Market. TATA consultancy services. 1-22

Reddy, N. and Suvikram, S. (2010). Garment, Apparel and Textile Sector – National Chamber of Exporters of Sri Lanka - http://www.nce.lk/garment-sri-lanka.html?lnum=30403. 41-63.

Rizwan, M. (2012). Global Warming and Clean Development. Mechanism Projects: State and Trends in India. *The ICFAI J. Environmental Economics*, **4**(3) : 71-81.

Sachdev, M. (2013).Carbon footprint of nations: A global, trade linked analysis. *Environmental Sci. & Technol.,* **4**(3) : 6414–6420.

Sharma, D. (2013). An analysis on carbon credits. *Asia Pacific J. Marketing & Management Review,* **2** (8) : 62-68.

Shende, B.R. and Jadhao, R.S. (2014). Carbon credit science and business. *Scientific Reviews Chemical Communications,* **4**(2) : 80-90.

Strauss, L. *et. al.* (2008). Levi Strauss & Co. self-declared environmental claims in accordance with ISO 14021. **3**(4) : 1-3.

Swenson, B. (2014). Carbon Credits Mean to Manufacturers. What. News You Can Use.1-4.

Systain (2010). A step in the right direction, EcoTextilesNews.

Yakkaldevi, A. (2015). Carbon credits in india. *Indian Streams Res. J.*., **5** (3) : 1-9.

http://www.slideshare.net/rehan20784/carbon-credit-10882472.

http://www.taxnaccounts.com/home/carbon-credits-use-importance#comments.

http://www.indiansugar.com/PDFS/Carbon%20Credit.pdf.

http://www.mcxindia.com/Uploads/Products/242/English_Carbon_Credit_CER.pdf.

http://dictionary.sensagent.com/Carbon%20credit/enen.

https://en.wikipedia.org/wiki/Carbon_credit.

http://www.indiantextilejournal.com/articles/FAdetails.asp?id=4711.

http://blog.mbaco.com/whatisacarboncreditsystem/www.indianresearchjournals.com.

http://www.textilevaluechain.com/index.php/article/technical/item/235roleofcarbonfootprintintextileandapparelindustry.

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