Carbon Neutrality in Garment Industries

Source: New Cloth Market

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Global warming and climate change has devastating effect on human life. Health and energy security is under threat. A tentative projection from the Third Assessment Report of the Intergovernmental Panel on Climate Change (IPCG) indicates that the region could experience a temperature increase to the order of five degrees Celsius by 2080 (IPCC TARWGIL 2001). The climate change would result in serious impacts on agriculture, forest and coastal resources, health of the population, the economy, its growth and upon national development.

Green House Gas Emission

According to the estimate of five different studies and report by Planning Commission, India's per capita GHG emissions in 2030-31 would be between 2.77-5.00 tonnes of Carbon Dioxide equivalent (C02e). Four studies also pointed that in 2031, India's per capita GHG emissions would stay under 4 tonnes of C02e which is lower than the global per capita emissions of 4.22 tonnes of C02e in 2005. The key drivers of the range of these estimates are the assumptions on GDP growth rates, penetration of clean energy, energy efficiency improvements etc. The fact that India's energy consumption and greenhouse gas emissions per capita are well below the world average leaves no room for complacence. The most effective way to address these challenges is to adopt a sustainable development approach by using environmentally sustainable technologies and promoting carbon reducing projects.

The process of measuring, calculating and declaring of an organization's direct and indirect GHG emissions is typically referred to as carbon foot printing. An accurate carbon footprint (measurement of all greenhouse gases a country produce) is an important step to manage and reduce the impact of your organization on climate change.

The carbon footprint is measured in tonnes of carbon dioxide equivalent. Carbon neutrality is very important for a sustainable development. Carbon Neutrality means achieving zero carbon emissions by compensating carbon dioxide released into the atmosphere from burning fossil fuels, with renewable energy that creates a similar amount of useful energy. In other words it refers to having a net zero carbon footprint.

The amount of carbon dioxide released can be offsetted with:

1. By funding carbon projects that will prevent future greenhouse gas emissions. The projects can be a) renewable energy project b) Resource conservation project c) Waste reduction project d) Forestry project.
2. By buying carbon credits to remove them through carbon trading.

Kyoto Protocol

According to Kyoto protocol (an international agreement between more than 170 countries), quotas have been fixed on the maximum amount of green house gases emission. The Kyoto Protocol is a protocol to the United Nations Framework Convention on Climate Change (UNFCCC or FCCC), an international environmental treaty with the goal of achieving "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Under the Kyoto Protocol, industrialized countries agreed to reduce their collective green house gas emissions by 5.2% from the level in 1990.

National limitations range from the reduction of 8% for the European Union and others to 7% for the United States, 6% for Japan, and 0% for Russia. Each operator has an allowance of credits, where each unit gives the owner the right to emit one metric tonne of carbon dioxide or other equivalent greenhouse gas. Operators that have not used up their quotas can sell their unused allowances as carbon credits, while businesses that are about to exceed their quotas can buy the extra allowances as credits, privately or on the open market. India comes under the third category of signatories to United Nations Framework Convention on Climate Change. India signed and ratified the Protocol in August, 2002 and has emerged as a world leader in reduction of greenhouse gases.

Carbon Credits

Carbon credits are certificates issued to countries that reduce their emission of greenhouse gases which causes global warming. Carbon credits are measured in units of certified emission reductions (CERs). Each CER is equivalent to one tonne of carbon dioxide reduction Many companies sell carbon credits to individuals who want to lower their carbon footprint.

There is a great opportunity awaiting India in carbon trading which is estimated to go up to $100 billion by 2010. In the new regime, the country could emerge as one of the largest beneficiaries accounting for 25 per cent of the total world carbon trade, says a World Bank report. The countries like US, Germany, Japan and China are likely to be the biggest buyers of carbon credits which are beneficial for India to a great extent. Currently there are five exchanges trading in carbon allowances: the Chicago Climate Exchange, European Climate Exchange, Nord Pool, PowerNext and the European Energy Exchange.

The Credits can be divided into two parts, Carbon Offset Credits and Carbon Reduction Credits. Carbon Offset Credits consist of clean forms of energy production, solar, wind, hydro and biofuels. Carbon Reduction Credits consists of the collection and storage of Carbon from our atmosphere through reforestation, forestation, ocean and soil collection and storage efforts.

According to the protocol, the gas reduction credits can be acquired under:

International Emission Trading:
Individual countries can trade in the international market so as to make for their allowances. The developed countries with quantified emission limitation and reduction commitments under Kyoto protocol may acquire credit from other such parties that have emission remaining lower than the upper limit provided for in the protocol during 2008-12.

Joint Implementation (JI):
Developed countries which has high cost of domestic green house reduction can set up a project in another developed countries which has comparatively lower cost. Emission reduction units are being assigned in these JI projects which are equivalent to one metric tonne of carbon dioxide equivalent.

Clean Development Mechanism (CDM):
A developed country can sponsor a greenhouse gas reduction project in a developing country where the cost of the project is substantially lower. The developed country receives certified emission reductions. The developing country has to approve the project subject to meeting the sustainable development criteria decided by the government of that country. The amount of emission reductions that will be associated with proposed project is the difference between emission in the baseline (without the implementation of COM project) and the proposed project, minus leakage.

Steps in CDM Process

1. **Project Design Document (POD) and Monitoring Plan preparation**

The main tasks, in developing a POD, would involve:

- Preparatory work - data collection, review of policies;
- General description of the project;
- Delineation of project boundary and identification of leakages;
- Assessment of various baseline methodologies and selection of the most appropriate one. This would also include a scan of approved projects or approved methodology to ascertain if there are approved methodologies which may be directly applied to this project;
- Development of a new baseline methodology, in the event none of the existing approved/proposed baseline methodologies are found appropriate for the project;
- Application of the selected/ developed baseline methodology to the project;
- Demonstration of various additionalities for the project;
- Estimation of project GHG emissions and absorption/ abatement/avoidance including direct/ indirect onsite/ offsite emissions;
- Assessment of various monitoring and verification (M&V) methodologies and selection of the most appropriate one. This would also include a scan of approved projects or approved methodologies to ascertain if there are approved methodologies which may be applied to this project;
- Development of a new M&V methodology, in the event none of the existing approved/proposed methodologies are found appropriate for the project.

- Estimation of potential streams of CERs.
- Environmental Impact Assessment for the project;
- Local stakeholder consultation;
- Sustainability assessment of the project;

2. **Host country approval**
3. **Validation**
4. **Approval of Baseline Methodology by CDM -Executive Board/Methane Panel**
5. **Project Registration**
6. **Monitoring and verification**
7. **Issuance of certified emission reduction (CER)**

Textile Sector and Environment

The sub sector of textile affects the environment to a great extent by releasing carbon dioxide in the atmosphere. The weaving and spinning sector contributes a lot to emission in carbon dioxide.

Carbon Dioxide Contribution from Textile Sector	
Garment	2%
Printing	7%
Spinning	41%
Dyeing	9%
Knitting	0%
Weaving	38%
Sizing	3%

(Source: compiled from journal of scientific & Industrial research article, www.nopr.niscair.res.in)

The above table shows the contribution of sub sectors in textile in carbon dioxide emission.

In Addition to this, through use of chemicals, solvents and huge quantities of water, textile product affects the environment drastically.

This apart, use of energy, solid waste and effluent discharge, emit dust, fumes, etc. to the atmosphere which are major environmental concerns of textile industry. Manufacturing of all variants of textiles have an impact on the environment. Usage of raw material and other natural resource inputs such as water etc have not only resource depleting or emissions have neutral resource degrading impacts. The industry is known to use large quantities of water during its processing.

Some Hard Facts

1. Textile dyeing & treatment accounts for 20 % of Industrial water pollution in India.
2. 72 toxic chemicals identified in water
3. 30 of which cannot be removed.
4. 1 Kg Fabric Production = 200 litres water
5. 1 Garment = 1,500 liters water

The manufacturing stages in textile industry comprise of yarn formation (fibre production, spinning) fabric formation (weaving and knitting) wet processing (dyeing, printing and finishing) and fabrication (garment), and the measure of water use in each stage is very important.

An average integrated textile mill produces 15 tons of finished cloth per day.

It uses a total of approximately 3,840 cubic meters of water per day, including 1,680 cubic meters for finishing and processing, another 960 cubic meters for steam generation, and an equivalent volume for serving the workers colony and other domestic uses of water. The water used for finishing and processing results in contaminated liquid effluent of approximately 1, 500 cubic meters per day.

In addition to this, according to Greenstratos Consulting, some flame retardants that are used in certain textiles contain organic bromine compounds that are persistent (break down very slowly in the environment). Textile industry is known to use restricted chemicals such as azo dyes and formaldehyde.

The most effective way to reduce the GHG emission is to adopt a sustainable development approach by using environmentally sustainable technologies.

Some of the sustainable technologies that can be used in the sub sector of textile industry are as follows:

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

1. Conversion of V-belt drives to flat belt drives;
2. Replacement of standard motors with energy-efficient ones;
3. Installation of energy-efficient lighting system (in place of conventional lighting);
4. Installation of energy-efficient fans for humidification plants;
5. Use of electronic ballast in place of conventional electromagnetic chokes.

Wet Processing Unit

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

Carbon Neutral Products

Carbon neutrality is not new in the Textiles & Clothing sector which contributes indirectly in carbon dioxide emissions. The textile industry and players across the value chain have adopted various strategies for reducing the carbon footprint. DuPont, the US based chemicals major, are offering Sorona, which reduces greenhouse gas emissions by 63 per cent, compared to conventional nylon made from petroleum. Sorona is a polymer which is made with agricultural feed stocks instead of petrochemicals and has high renewable ingredients content (37% by weight). Fabrics made with Sorona provide a 30-per cent carbon dioxide reduction while the Sorona manufacturing process.

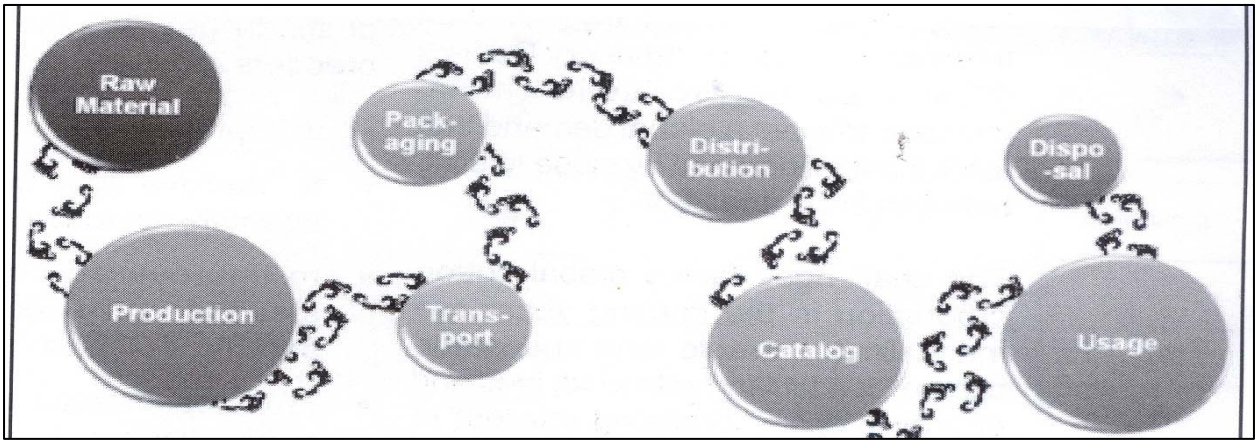
Anvil Recycled t-shirt is an innovative, affordable product that has less impact on the environment, reuses leftover materials that most apparel makers see as waste, and avoids the dyeing process saving significant amounts of energy and resources. The Anvil Recycled t-shirt is Certified Carbon Free by Carbonfund.org, the leading nonprofit carbon offset and climate solutions organization.

How to calculate C02 Footprints

The Carbon Footprint of a product is the total amount of C02 and other greenhouse gases that are emitted as part of its manufacture, distribution, use and disposal. Greenhouse gases (GHGs) are so called because they trap heat in the Earth's atmosphere and keep the planet warm: too much GHG in the atmosphere causes climate change. The main greenhouse gases are carbon dioxide (C02), methane and nitrous oxide.

Calculating the Carbon Footprint

Steps 1 - Drawing up a map of the key stages in our supply chain - From growing the raw material, to getting the product to the consumer, to finally disposing it.
Step 2 - Looking at the energy consumption directly involved in each of these stages and converting this into the resulting amount of carbon emissions.
Step 3 - Adding up the carbon emissions from each of these stages to get the calculated value.



Total C02 Emission for a 100% Cotton white T-shirt, Size 40-42: 10, 75 kg
Raw Material + Production + Transport + Disposal + Packaging = 5, 05 kg
Distribution + Catalog = 2, 4 kg Usage (Washing & Drying) = 3, 30 kg

Up to 80% of the environmental impact of a t-shirt occurs post purchase (after you've bought it): the water, chemical toxicity, energy use and emissions from washing and drying your clothing. This means that if every clothing manufacturer in the world halved their eco-footprint of their supply chain, it would still only make 10% difference over the whole product life cycle. We may do everything we can to make sure our product life cycle is sustainable, and this must include post purchase efforts like wash cool, hang dry, etc.

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