

CARBON FOOTPRINTS, INDUSTRIALISATION AND ENVIRONMENT

**– Ms. Savita Punjabi, Head,
Dept. of Commerce,
Bharat College of Commerce & Science,
Badlapur (W)**

Abstract

Greenhouse gases can be emitted through transport, land clearance, and the production and consumption of food, fuels, manufactured goods, materials, wood, roads, buildings, and services. For simplicity of reporting, it is often expressed in terms of the amount of carbon dioxide, or its equivalent of other GHGs, emitted. Most of the carbon footprint emissions for the average U.S. household come from "indirect" sources, i.e. fuel burned to produce goods far away from the final consumer. These are distinguished from emissions which come from burning fuel directly in one's car or stove, commonly referred to as "direct" sources of the consumer's carbon footprint.

The paper throws light on the carbon footprints, Kyoto Protocol and the ways of measuring of carbon footprints. It probes into the increase in the carbon emission rate due to increase in the rate of industrialization. It also highlights certain facts of sufferings relating to our country India due to carbon footprints and also the steps to reduce it at an individual level. Thus to conclude, it suggest to join hands in order to fight with this international issue that challenges our survival.

CARBON FOOTPRINTS, INDUSTRIALISATION AND ENVIRONMENT

Introduction

A carbon footprint has historically been defined by Championne as "the total sets of greenhouse gas (GHG) emissions caused by an organization, event, product or person." However, calculating the total carbon footprint is impossible due to the large amount of data required and the fact that carbon dioxide can be produced by natural occurrences. It is for this reason that Wright, Kemp, and Williams, writing in the journal *Carbon Management*, have suggested a more practicable definition:

"A measure of the total amount of carbon dioxide (CO₂) and methane (CH₄) emissions of a defined population, system or activity, considering all relevant sources, sinks and storage within the spatial and temporal boundary of the population, system or activity of interest. Calculated as carbon dioxide equivalent (CO₂e) using the relevant 100-year global warming potential (GWP100)."

Greenhouse gases can be emitted through transport, land clearance, and the production and consumption of food, fuels, manufactured goods, materials, wood, roads, buildings, and services. For simplicity of reporting, it is often expressed in terms of the amount of carbon dioxide, or its equivalent of other GHGs, emitted. Most of the carbon footprint emissions for the average U.S. household come from "indirect" sources, i.e. fuel burned to produce goods far away from the final consumer. These are distinguished from emissions which come from burning fuel directly in one's car or stove, commonly referred to as "direct" sources of the consumer's carbon footprint.

The concept name of the carbon footprint originates from ecological footprint, discussion, which was developed by Rees and Wackernagel in the 1990s which estimates the number of "earths" that would theoretically be required if everyone on the planet consumed resources at the same level as the person calculating their ecological footprint. However, carbon footprints are much more specific than ecological footprints since they measure direct emissions of gasses that cause climate change into the atmosphere.

Measuring Carbon Footprints

An individual's, nation's, or organization's carbon footprint can be measured by undertaking a GHG emissions assessment or other calculative activities denoted as carbon accounting. Once the size of a carbon footprint is known, a strategy can be devised to reduce it, e.g. by technological developments, better process and product management, changed Green Public or Private Procurement (GPP), carbon capture, consumption strategies, and others. Several free online carbon footprint calculators exist, with at least one supported by publicly available peer-reviewed data and calculations from the University of California, Berkeley's Cool Climate Network research consortium.^{[6][7]} These websites ask you to answer some basic questions about your diet, transportation choices, home size, shopping and recreational activities, usage of electricity, heating, and heavy appliances such as dryers and refrigerators, and so on. The website then estimates your carbon footprint based on your answers to these questions. The mitigation of carbon footprints through the development of alternative projects, such as solar or wind energy or reforestation, represents one way of reducing a carbon footprint and is often known as Carbon offsetting.

The main influences on carbon footprints include population, economic output, and energy and carbon intensity of the economy. These factors are the main targets of individuals and businesses in order to decrease carbon footprints. Scholars suggest the most effective way to decrease a carbon footprint is to either decrease the amount of energy needed for production or to decrease the dependence on carbon emitting fuels.

By area

The Average Carbon Footprint in the United States vs. World The average U.S. household carbon footprint is 48 tons CO₂e per year. The single largest source of emissions for the typical household is from driving (gasoline use). Transportation as a whole (driving, flying & small amount from public transit) is the largest overall category, followed by housing (electricity, natural gas, waste, construction) then food (mostly from red meat, dairy and seafood products, but also includes emissions from all other food), then goods followed lastly by services. The carbon footprint of U.S. households is about 5 times greater than the global average, which is approximately 10 tons CO₂e per household per year. For most U.S. households, the single most important action to reduce their carbon footprint is driving less or switching to a more efficient vehicle. Cement production and carbon footprint resulting from soil sealing was 8.0 Mg person⁻¹ of total per capita CO₂ emissions (Italy, year 2003); the balance between C loss due to soil sealing and C stocked in man-made infrastructures resulted in a net loss to the atmosphere, - 0.6 Mg C ha⁻¹ y⁻¹.

Of products

Several organizations have calculated carbon footprints of products; The US Environmental Protection Agency has addressed paper, plastic (candy wrappers), glass, cans, computers, carpet and tires. Australia has addressed lumber and other building materials. Academics in Australia, Korea and the US have addressed paved roads. Companies, nonprofits and academics have addressed mailing letters and packages. Carnegie Mellon University has estimated the CO₂ footprints of 46 large sectors of the economy in each of eight countries. Carnegie Mellon, Sweden and the Carbon Trust have addressed foods at home and in restaurants.

The Carbon Trust has worked with UK manufacturers on foods, shirts and detergents, introducing a CO₂ label in March 2007. The label is intended to comply with a new British Publicly Available Specification (i.e. not a standard), PAS 2050,¹ and is being actively

piloted by The Carbon Trust and various industrial partners. As of August 2012 The Carbon Trust state they have measured 27,000 certifiable product carbon footprints.

Evaluating the package of some products is key to figuring out the carbon footprint. The key way to determine a carbon footprint is to look at the materials used to make the item. For example, a juice carton is made of an aseptic carton, a beer can is made of aluminum, and some water bottles either made of glass or plastic. The larger the size, the larger the footprint will be.

Of energy

The following table compares, from peer-reviewed studies of full life cycle emissions and from various other studies, the carbon footprint of various forms of energy generation: Nuclear, Hydro, Coal, Gas, Solar Cell, Peat and Wind generation technology.

Kyoto Protocol, carbon offsetting and certificates

Carbon dioxide emissions into the atmosphere, and the emissions of other GHGs, are often associated with the burning of fossil fuels, like natural gas, crude oil and coal. While this is harmful to the environment, carbon offsets can be purchased in an attempt to make up for these harmful effects.

The Kyoto Protocol defines legally binding targets and timetables for cutting the GHG emissions of industrialized countries that ratified the Kyoto Protocol. Accordingly, from an economic or market perspective, one has to distinguish between a *mandatory market* and a *voluntary market*. Typical for both markets is the trade with emission certificates:

- Certified Emission Reduction (CER)
- Emission Reduction Unit (ERU)
- Verified Emission Reduction (VER)

Mandatory market mechanisms

To reach the goals defined in the Kyoto Protocol, with the least economical costs, the following flexible mechanisms were introduced for the mandatory market:

- Clean Development Mechanism (CDM)
- Joint Implementation (JI)
- Emissions trading

The CDM and JI mechanisms requirements are for projects which create a supply of emission reduction instruments, while Emissions Trading allows those instruments to be sold on international markets.

- Projects which are compliant with the requirements of the CDM mechanism generate Certified Emissions Reductions (CERs).

- Projects which are compliant with the requirements of the JI mechanism generate Emission Reduction Units (ERUs).

The CERs and ERUs can then be sold through Emissions Trading. The demand for the CERs and ERUs being traded is driven by:

- Shortfalls in national emission reduction obligations under the Kyoto Protocol.
- Shortfalls amongst entities obligated under local emissions reduction schemes.

Nations which have failed to deliver their Kyoto emissions reductions obligations can enter Emissions Trading to purchase CERs and ERUs to cover their treaty shortfalls. Nations and groups of nations can also create local emission reduction schemes which place mandatory carbon dioxide emission targets on entities within their national boundaries. If the rules of a scheme allow, the obligated entities may be able to cover all or some of any reduction shortfalls by purchasing CERs and ERUs through Emissions Trading. While local emissions reduction

schemes have no status under the Kyoto Protocol itself, they play a prominent role in creating the demand for CERs and ERUs, stimulating Emissions Trading and setting a market price for emissions. Well-known mandatory local emissions trading scheme is the EU Emissions Trading Scheme (EU ETS).

New changes are being made to the trading schemes. The EU Emissions Trading Scheme is set to make some new changes within the next year. The new changes will target the emissions produced by flight travel in and out of the European Union. Other nations are scheduled to start participating in Emissions Trading Schemes within the next few years. These nations include China, India and the United States.

Voluntary Market Mechanisms

In contrast to the strict rules set out for the mandatory market, the voluntary market provides companies with different options to acquire emissions reductions. A solution, comparable with those developed for the mandatory market, has been developed for the voluntary market, the Verified Emission Reductions (VER). This measure has the great advantage that the projects/activities are managed according to the quality standards set out for CDM/JI projects but the certificates provided are not registered by the governments of the host countries or the Executive Board of the UNO. As such, high quality VERs can be acquired at lower costs for the same project quality. However, at present VERs can not be used in the mandatory market.

The voluntary market in North America is divided between members of the Chicago Climate Exchange and the Over The Counter (OTC) market. The Chicago Climate Exchange is a voluntary yet legally binding cap-and-trade emission scheme whereby members commit to the capped emission reductions and must purchase allowances from other members or offset excess emissions. The OTC market does not involve a legally binding scheme and a wide array of buyers from the public and private spheres, as well as special events that want to go carbon neutral.

There are project developers, wholesalers, brokers, and retailers, as well as carbon funds, in the voluntary market. Some businesses and nonprofits in the voluntary market encompass more than just one of the activities listed above. A report by Ecosystem Marketplace shows that carbon offset prices increase as it moves along the supply chain—from project developer to retailer.

While some mandatory emission reduction schemes exclude forest projects, these projects flourish in the voluntary markets. A major criticism concerns the imprecise nature of GHG sequestration quantification methodologies for forestry projects. However, others note the community co-benefits that forestry projects foster. Project types in the voluntary market range from avoided deforestation, afforestation/reforestation, industrial gas sequestration, increased energy efficiency, fuel switching, methane capture from coal plants and livestock, and even renewable energy. Renewable Energy Certificates (RECs) sold on the voluntary market are quite controversial due to additionality concerns.^[22] Industrial Gas projects receive criticism because such projects only apply to large industrial plants that already have high fixed costs. Siphoning off industrial gas for sequestration is considered picking the low hanging fruit; which is why credits generated from industrial gas projects are the cheapest in the voluntary market.

The size and activity of the voluntary carbon market is difficult to measure. The most comprehensive report on the voluntary carbon markets to date was released by Ecosystem Marketplace and New Carbon Finance in July 2007.

ÆON of Japan is firstly approved by Japanese authority to indicate carbon footprint on three private brand goods in October 2009.

Ways to reduce carbon footprint

The most common way to reduce the **carbon footprint** of humans is to Reduce, Reuse, Recycle. In manufacturing this can be done by recycling the packing materials, by selling the obsolete

inventory of one industry to the industry who is looking to buy unused items at lesser price to become competitive. Nothing should be disposed off into the soil, all the ferrous materials which are prone to degrade or oxidize with time should be sold as early as possible at reduced price.

This can also be done by using reusable items such as thermoses for daily coffee or plastic containers for water and other cold beverages rather than disposable ones. If that option isn't available, it is best to properly recycle the disposable items after use. When one household recycles at least half of their household waste, they can save 1.2 tons of carbon dioxide annually

Another easy option is to drive less. By walking or biking to the destination rather than driving, not only is a person going to save money on gas, but they will be burning less fuel and releasing fewer emissions into the atmosphere. However, if walking is not an option, one can look into carpooling or mass transportation options in their area.

Yet another option for reducing the carbon footprint of humans is to use less air conditioning and heating in the home. By adding insulation to the walls and attic of one's home, and installing weather stripping or caulking around doors and windows one can lower their heating costs more than 25 percent. This helps because it reduces the amount of energy needed to heat and cool the house. One can also turn down the heat while they are sleeping at night or away during the day, and keep temperatures moderate at all times. Setting the thermostat just 2 degrees lower in winter and higher in summer could save about 1 ton of carbon dioxide each year

Certain facts about India:

1) According to Business Standard, Delhi dated 3rd December, 2012, the carbon emissions in China US and European Union contributed 28%, 16% and 11% in the global emission during the year while the Indian figures were at seven percent despite a 7.5% growth during the year.

2) According to Business Line, Delhi dated 6th December, 2012, larger developing countries like India and China, who are among today's major polluters but have minimal historical role in taking the concentration of greenhouse gases in the atmosphere to its present level, are coming under increasing pressure to share the burden of emission reduction.

3) R. R. Rashmi, Joint Secretary of Environment Affairs and Indian negotiator firmly said that "When the framework of the UN convention on climate change was developed, equity was established as a principle but unfortunately we see today an unwillingness to accept this principle as a basis for actions." She strongly represented India in the Durban platform.

4) In an expert study titled 'Sharing Lessons on Mangrove Restoration', it was stressed that Royall Bengal tigers, in Sunderbans are facing a continuous threat due to changing eco system and increasing human pressures. (A report in Pioneer, Delhi, dated 10th December, 2012.)

5) The environment department had earlier prepared a report saying that change in the climate may begin as early as 2021 with average temperature soaring up, less occurrence of rainfall, a sharp rise in sea water level and tropical country diseases like Malaria to create more impact. The study also gives a warning that the majority of the mangrove forest in Sunderbans may go down under water. (A report in Times of India, Delhi, dated 13th December, 2012.)

6) Climate change is affecting women in Guwahati. As due to global warming, their land cultivation is reduced leading to the reduction in income. Now they are forced to move out for the jobs leaving the responsibilities of the house chores on their daughters. So the girls have to drop out schools in order to manage the houses. Thus the women section in the marginalized families is severely affected. (A report in Assam Tribune, Guwahati, dated 14th December, 2012.)

Ten ways to reduce carbon emissions (**TIMESOFINDIA.COM** Jun 5, 2008)

Big nations are talking about reducing carbon emissions by going green or opting for a low carbon economy. But, as individuals, we too can make a difference. Some simple steps to reduce carbon emissions:

1. Change your bulbs

Replace your most frequently used bulbs with compact fluorescents (CFLs). These use four times less energy and last eight times longer.

2. Drive less

Walk, bike, car pool or take public transport at least once a week if you are a daily driver. You'll save 1.5 kg carbon dioxide for every 5 km you don't drive. Switch off your car if you stop for more than two minutes.

3. Keep your tyres inflated .

This improves the fuel efficiency of your car. Every litre of petrol saved keeps 2.5 kg of carbon dioxide out of the atmosphere. Using radial tyres will help you save 3 to 7 % of fuel

4. Use solar energy

Sunlight can be used in many ways to save energy. Use a solar water heater instead of an electric geyser. A 100-litre solar water heater can save around 15 units of electricity every year.

5. Plant more trees

A single tree can absorb one tonne of carbon dioxide over its lifetime.

6. Turn off electronic devices

Simply turning off your television stereo, computer, fans lights when you are not using them will save you thousands of kg of carbon dioxide a year.

7. Reuse and Recycle

Recycling and re-using products like paper and bottles will protect the environment. Just by reducing your garbage by 25 per cent will reduce carbon dioxide emissions by 1,000 pounds a year.

8. Move your A/C thermostat up .

You could save about 900 kg of carbon dioxide a year with this simple adjustment. Set the thermostat of the room air conditioner at 25 C to get the most comfort at the least cost.

9. Use energy efficient computer

Buy a laptop instead of a desktop. It consumes five times less electricity. If you buy a desktop, get an LCD screen.

10. Make a commitment of reducing your carbon footprint.

Spread different ways to reduce carbon emissions to other people, to your office management or write to decision makers.

Remember simple ways work.

References:

- 1) India Green File, December 1 to 31, 2012 No. 300 published by Centre for Science and Environment, New Delhi - 110062
- 2) Environmental Economics, 3rd Edition, David Burningham and John Davies, Rain Tree publishing pvt. Ltd. Chennai 600 042
- 3) Environmental Principles and Policies, Sharon Beder, Viva Books Private Limited, Vew Delhi – 110002
- 4) www.amazon.com