Carbon Footprinting in the Web Converting Industry

By

Dean DeGhetto and Ross MacWhinney
First Environment, Inc.
91 Fulton Street
Boonton, NJ 07005
(973) 334-0003 (tel)
(973) 334-0928 (fax)
dhd@firstenvironment.com
ram@firstenvironment.com

The threat of global climate change has emerged as the world's most urgent environmental challenge with implications on areas as diverse as international trade and economic growth, national security, global food and water supply, disease control, and environmental degradation. Regardless of an individual's view of the realities of these threats, it has become clear that the federal government has made the reduction of greenhouse gas (GHG) emissions a central issue.

Debate over climate and energy legislation is scheduled to begin in the U.S. Senate after the U.S. House of Representatives passed the American Clean Energy and Security Act of 2009 (ACES Act) on June 26 by a vote of 219 to 212. President Barack Obama has repeatedly stated that signing climate change policy is among his main legislative priorities. On the international level, governments from around the world are set to meet in Copenhagen in December 2009 to outline a successor agreement to the Kyoto Protocol, which created a global market for greenhouse gas emission credits. As climate change policy becomes a reality in the US, it is critical that leaders in the web converting industry understand how measurement of GHGs takes place on a basic level. Many industries may soon be included in mandatory reporting of emissions, while others may be required to make emissions reductions and may find themselves participating in markets for greenhouse gas credits.

This briefing aims to introduce members of the Association of Industrial Metallizers, Coaters, and Laminators (AIMCAL) to a set of fundamentals of climate change and greenhouse gas management that First Environment believes are important to the industry. These include an introduction to climate change and greenhouse gases, a description of carbon footprinting, cap and trade regulation, GHG emitting activities in the converting industry, and the importance of assessing and understanding a carbon footprint.

Climate Change and Greenhouse Gases

Climate change is essentially a result of the Earth's natural greenhouse effect being pushed out of balance by an increase in emissions of greenhouse gases. The greenhouse effect is created by the reflection of heat back towards the Earth's surface by gases in the atmosphere known as greenhouse gases. While a certain atmospheric concentration of greenhouse gases has provided for the relatively comfortable climate that supports life on Earth, the recent increase in this concentration threatens to also increase the average temperature of Earth's climate, locking more energy beneath the atmosphere. This increase comes primarily from the combustion of fossil fuels in power generation and transportation, and from the clearing of forests. The resultant increase in temperature is expected to lead to an increase in severity and frequency of weather events such as drought, floods, hurricanes and damaging storms. These are expected to lead not only to destruction of property, but also to widespread humanitarian crises such as famine and disease, and in turn a significant impact on economic and social systems.

International negotiations in the 1990s identified six greenhouse gases to be controlled in efforts to mitigate climate change. These include the three most prevalent GHGs emitted today (carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_20)) as well as three long-lived GHGs in the atmosphere ((hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF_6)). This group of six "Kyoto" greenhouse gases has become widely accepted as the standard collection of GHGs to be considered for reduction. Other prevalent greenhouse gases include CFCs and even water vapor. However, atmospheric water vapor is not affected much by human activity and CFC emissions are already controlled under the United Nations' Montreal Protocol of 1987.

Within the web converting industry the most common GHG emissions come in the form of carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_20) from fossil fuel combustion in drying ovens, thermal oxidizers, and industrial boilers.

Carbon Footprinting

Carbon footprinting is a way to account for the total amount of greenhouse gases produced directly and indirectly by a group or organization. Footprints can be assessed for many different entity types including private companies, hospitals and universities, individual facilities, industry groups, regions, states, and countries. The larger the entity being assessed, the more the assessment will need to rely on aggregated and generalized data, rather than site specific emissions readings.

The size of a carbon footprint is usually expressed in equivalent tons of carbon dioxide (CO_2). Standard methods for assessing carbon footprints have been developed by several groups over the years. The leading efforts in this area include the World Resources Institute /World Business Council for Sustainable Development GHG Protocol (Protocol), the International Standards Organization's ISO 14064 Part 1: Organization Level GHG Quantification & Reporting (Standard), and the guidelines set out by The Climate Registry for entity reporting.

If a federal cap and trade system is passed into law, it will be necessary for all covered sectors to face mandatory GHG emissions reporting rules in order to provide a baseline for any emissions reductions to be measured against. Carbon footprinting will help a company understand its carbon exposure, and allow its executives to plan for compliance with impending legislation.

Cap and Trade

It has become increasingly likely that the US will aim to control and reduce emissions of GHGs with some form of market based system rather than by implementing a command-and-control approach, or by levying taxes on GHG emitters. This is most likely to take the form of a cap and trade system. The goal of cap and trade is to provide economic incentives for emitters of a pollutant (in this case GHGs) to reduce their emissions. To create this system, a reduction target or cap must be set on the amount of GHGs that may be emitted from a sector, industry, or economy. This cap is generally measured in metric tons of CO_2e, or carbon dioxide equivalent. For example, one (1) metric ton of carbon dioxide is equal to one (1) metric ton of CO_2e; one (1) metric ton of methane is equal to 21 metric tons of CO_2e; and one (1) metric ton of nitrous oxides is equal to 310 metric ton of CO_2e.

Each ton of CO_2e = one (1) allowance. The allowances from this cap are then allocated to the emitters in this sector by a variety of methods, including free allocation, grandfathering, or auction. At the end of each reporting period, emitters in the capped sectors will be required to submit enough allowances to cover their emissions from that period. Those that fail to do so will face a potential monetary penalty.

The primary advantage of this system is that it creates a profit motive for making reductions in GHG emissions. Sources whose emissions are below their individual cap may sell their excess allowances to others who exceed their cap, creating a market for emissions allowances. The market value of an allowance can potentially lead a firm or facility to make reductions above and beyond what its cap requires in order to sell off excess allowances for a profit. In this way, cap and trade can provide incentives for "over-compliance". It also allows flexibility in decision making to the industry. A facility owner can assess if it is more cost effective to make emissions reductions on site or to go to the market to purchase allowances to cover its emissions levels. This allows emissions reductions to take place first in facilities where it is least expensive to implement.

GHG Emitting Activities

Carbon footprints are assessed by accounting for the direct and indirect emissions associated with the entity's activities. Direct emissions are those that come from sources owned or controlled by the reporting company. Examples of direct emissions include onsite use of fossil fuels such as natural gas for drying ovens, thermal oxidizers, and

industrial boilers. They may also include transportation of raw materials, finished products, and waste. Indirect emissions are those that are a consequence of the activities of the reporting company, but which occur from sources owned or controlled by another company. These may include imported or purchased electricity, heat, or steam. Employee business travel, outsourced activities, and emissions from the disposal of company-generated waste in non-company owned facilities might also be included as indirect emissions.

The converting industry has a set of clear sources of direct and indirect greenhouse gas emissions. For example, drying ovens, thermal oxidizers, and industrial boilers and heaters are typically fired on fossil fuels such as natural gas, fuel oil, and propane. Fossil fuel combustion results in GHG emissions, and is likely to be the main source of direct GHG emissions in a converting facility. The transportation of raw materials and finished goods within a manufacturing plant, employee commuting, and business-related travel are other direct sources of GHG emissions.

Over-the-road transportation of raw materials and finished goods and external power generation (to supply electricity for plant lighting, converting equipment and metallizers) are indirect sources of GHG emissions associated with the web converting industry.

Why and How to Build a GHG Inventory

There are a number of reasons to build a GHG inventory, or carbon footprint, for your company or your manufacturing facilities. Key among these is the need to determine your exposure and risk under regulation of greenhouse gases. Performing a GHG inventory will allow you to begin to plan for future regulation and identify areas where reductions could be made if regulations are passed. Registering your GHG inventory on a well know registry such as The Climate Registry can also improve your company's corporate image as a socially responsible organization.

There are a number of state and regional programs that are available to you separate from federal climate policy. These include California's AB32, the Regional Greenhouse Gas Initiative (RGGI) in the mid-Atlantic and New England states, and the Western Climate Initiative (WCI) which includes much of western states as well as most states in Canada. Firms with facilities in any of these areas may soon face regional or state level requirements to report GHG emissions or to make reductions. Performing a GHG inventory now will allow you to create a game plan for impending legislation. These groups can also get experience in emissions trading by becoming members of the Chicago Climate Exchange (CCX), a voluntary but binding international cap-and-trade system.

Building an Inventory

When developing a GHG inventory, you must first consider your goals. Will you be requiring a complete inventory with detailed attention paid to all of your emissions sources? Or will the inventory take a look only at the biggest sources available? Do you intend to report the inventory to a group like The Climate Registry, the CCX, or the California Climate Action Registry (CCAR)? If so, you will need to have the inventory verified by a third party auditor. Third party verification will require that you implement a systematic data collection process and management system, and that you maintain traceable records of your management data and monitoring equipment.

If registering your emissions, you will also need to select the appropriate inventory protocol for your end use. Developing a climate action plan or policy will help you determine what sources you need to include, and what protocol you should be using.

Once you have your goals established, it is time to identify and calculate your emissions. This involves identifying and classifying your direct and indirect emissions sources. Different emissions sources will require different methods of calculation, including direct reading of instruments, using mass balances, or utilization of activity data and established emissions factors. Once the approach is identified, you will need to collect data, choose the appropriate emissions factors, and calculate your emissions.

In addition to inventory development, many plants may have the potential to implement offset projects. Offset projects can earn tradable carbon credits for making emissions reductions outside of a capped sector. Examples may include fuel efficiency and energy conservation activities such as installing high efficiency burners and heat exchangers, switching from solvent based coatings to water based or 100% solids coatings, or heating, ventilation, and air conditioning (HVAC) controls. There may also be opportunities in power consumption, including plant lighting retrofits, solar power, variable frequency motor drives, plant layout changes to reduce internal transportation, and power factor improvements.

While the development and implementation of an offset project can be a large undertaking, it may present an opportunity to monetize available GHG emission reduction credits, while allowing your facility to fit under a future GHG emissions cap.

Conclusion

We are rapidly entering a “carbon constrained” economy. The development of climate change regulations will bring challenges as well as opportunities to the web converting industry. It is important to take early action in order to understand your risks, and to turn those risks into an opportunity to flourish in such an economy.