



PROVIDING CARBON FOOTPRINT VISIBILITY AND
PLANNING CAPABILITIES ACROSS THE SUPPLY CHAIN

WHY YOU NEED TO DO IT, AND **WHAT** YOU NEED TO DO IT

Carbon Footprint

The total amount of Greenhouse gasses emitted over a product's lifespan including raw material, the manufacturing process, product usage, and disposal.

INTRODUCTION

Carbon is challenging business in many ways and customers, investors and other stakeholders are paying very close attention to how the challenge is met. Those that react well to the challenge will be seen as innovators and will be rewarded; others will fall behind and risk becoming an afterthought or worse.

This paper provides a brief exploration of the current carbon landscape and will outline the attributes of an ideal set of supply chain carbon management tools.

THE TIME TO BEGIN A CARBON PLAN IS NOW

There is a great deal of uncertainty surrounding upcoming carbon regulation. This uncertainty will no doubt last for quite some time as diplomats and politicians work out the tangled details of a global carbon management strategy. What is very certain is that carbon emissions will play a more important role in a growing number of companies. Knowledge of these emissions and how they interact with your business will be critical to success. The sooner the process begins, the better prepared your company will be.

Political Overview

Preparations are currently underway for the Copenhagen¹ conference in December 2009 which aims to create a successor to the current Kyoto Protocol². The Kyoto Protocol is due to expire in 2012 and all indications are that its successor will cover a broader spectrum of industries and be more stringent in its carbon allowances. The Kyoto protocol aimed to reduce emissions by 8% from 1990 levels by 2012; scientists are now recommending more aggressive reductions of 25% below 1990 levels by 2020.

Depending on their geographic location, companies in the U.S. may be contending with a patchwork of global and regional carbon initiatives as well as keeping an eye on the American Clean Energy and Security Act³ (ACES, commonly known as the Waxman-Markey bill) as it makes its way into the U.S. Senate. The bill as it currently stands would aim to reduce greenhouse gas (GHG) emissions by 17% from 2005 levels by 2020. The mechanism to attain this goal would be to use revenue generated from a cap and trade program to fund renewable and low carbon technologies. Utilities, Oil Refiners, and Manufacturers would need an allowance for every ton of GHG emitted.

1: United Nations Climate Change Conference, Dec 7- Dec 19, 2009. <http://en.cop15.dk/frontpage>

2: The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change. http://unfccc.int/kyoto_protocol/items/2830.php.

3: American Clean Energy and Security Act of 2009. <http://www.govtrack.us/congress/bill.xpd?bill=h111-2454>

Greenhouse Gas (GHG)

Primarily Carbon Dioxide (CO₂), but also includes, Methane (CH₄), Nitrous Oxide (N₂O), Hydrofluorocarbons (HFCs), Perfluorocarbons (PFCs) and others

Carbon Intensity

(GHG emissions per metric ton / Revenue)

Companies that have lower carbon intensity relative to their competitors will be better positioned as carbon emissions become more and more regulated.

Regionally, US companies may be impacted by either the California Climate Registry⁴ or the (RGGI) Regional Greenhouse Gas Initiative,⁵ which is a group of ten Northeast and Mid-Atlantic States. RGGI focuses on power utilities and aims for a 10% reduction in GHG emissions by 2018.

On a larger scale, multi-enterprise companies will need to understand and obey many regional regulations on a global scale.

The European Union (EU) instituted a carbon trading program in 2005; the ETS (European Trading System)⁶ was put into place to help the EU meet the Kyoto protocol and covers over 10,000 installations, representing 40% of Europe's GHG emissions. Heavy industry and power generators are currently the focus, but Aviation is scheduled to be added in 2012 with all major industrial polluters due to follow in 2013.

China, the largest GHG emitter, is not part of the Kyoto agreement. They are however taking significant steps to reduce GHG emissions. They have two primary goals; to reduce energy intensity by 20% from 2005 levels by 2010, and to generate 15% of their energy from renewable sources by 2020.

India, the 4th largest GHG emitter also follows its own guidelines called the National Action Plan on Climate Change (NAPCC)⁷.

While there are significant regional variations to carbon regulation, what is important is that the overall trend is toward more stringent regulation. Companies that adopt the most strenuous standards now will be rewarded later when these become adopted as law.

Other Factors Contributing to Carbon Awareness

Current and future regulatory forces might be the primary force driving many companies to better understand and manage their carbon emissions but upon further inspection, there may be other factors of greater importance, or at least of greater urgency.

► Energy Efficiency and Disposal Costs

The most obvious and immediately rewarding reasons for managing carbon are the cost savings that can be derived from increasing energy efficiency and reducing waste disposal costs. Carbon based fuels will become more expensive, either through natural market forces or through government intervention. Likewise, Carbon disposal costs also will continue to rise.

► Customer and Investor Relations

Companies that actively monitor and manage their GHG emissions are seen by consumers and investors as strategically minded. This will likely become more

4: The California Climate Action Registry is a program of the Climate Action Reserve and serves as a voluntary greenhouse gas (GHG) registry to protect and promote early actions to reduce GHG emissions by organizations. <http://www.climateregistry.org/about.html>

5: The Regional Greenhouse Gas Initiative (RGGI) is the first mandatory, market-based effort in the United States to reduce greenhouse gas emissions. <http://www.rggi.org/home>

6: The European Union Greenhouse Gas Emission Trading System (EU ETS) is the largest multi-country, multi-sector Greenhouse Gas Emission Trading System world-wide. http://ec.europa.eu/environment/climat/emission/index_en.htm

7: India released the National Action Plan on Climate Change (NAPCC) on 30th June 2008 to outline its strategy to meet the challenge of Climate Change. <http://www.energymanagertraining.com/NAPCC/main.htm>

Companies that follow the path of least resistance, ignoring carbon emissions and moving operations to more lenient geographic locations, are contributing to ‘carbon leakage’.

important from a consumer standpoint if research continues to support the role of GHG emissions in global warming. Likewise, companies that show they are prepared to handle strict GHG legislation will appear to be a good investment. An example of the investment community’s interest can be seen in the Carbon Disclosure Project (CDP)⁸. The CDP is a non-profit intermediary that works with the large corporations and shareholders on climate issues. Their annual information request is signed by over 475 institutional investors with \$55 trillion in assets under management.

Companies that follow the path of least resistance, ignoring carbon emissions and moving operations to more lenient geographic locations, are contributing to ‘carbon leakage’. These companies run the risk of resentment from customers and developing a near-sighted strategic reputation from the investment community.

► **Technological Innovation**

Companies that adopt the strictest emissions standards will be rewarded when their technological improvements allow them to bring appropriate products to market when these standards likely become law. This was nicely illustrated in an example in a recent *Harvard Business Review* article⁹ showing how if the big three US auto manufacturers had adopted the California Air Resources Board fuel consumption and emissions standards when they were first proposed in 2002, they would have been in a much more competitive position relative to their competition when it becomes US law in 2016.

► **Forecasting: Expenses and Revenue**

As companies understand and manage their own carbon emissions, they will be better able to project future carbon expenses. Companies that have succeeded in reducing their carbon usage relative to their industry peers may be in a position to project future revenue from trading unused carbon allowances. Once the carbon accounting is more completely understood the return on investment for additional projects such as carbon capture and storage (CCS) can be calculated.

► **Market Entry**

Forward looking multi-enterprise companies are relying on their suppliers for the emissions data that they need in order to compile a complete carbon footprint of their final products. The inability to supply this information will likely keep some suppliers out of the bidding process altogether.

Barriers

There are many compelling and potentially mandatory reasons for launching a GHG emissions initiative, but there are also a multitude of barriers that threaten to make this a difficult undertaking.

8: The Carbon Disclosure Project is an independent not-for-profit organization holding the largest database of primary corporate climate change information in the world. <https://www.cdproject.net/en-US/Pages/HomePage.aspx>

9: Ram Nidumolu, C.K. Prahalad, and M.R. Rangaswami, “Why Sustainability Is Now the Key Driver of Innovation,” *Harvard Business Review*, September 2009. <http://hbr.harvardbusiness.org/2009/09/why-sustainability-is-now-the-key-driver-of-innovation/es>

SCOPES

Emissions are typically categorized into one of three ‘scopes’. This is a widely adopted concept developed by the [World Resources Institute](#) and the [World Business Council for Sustainable Development](#).

Scope 1 - Direct operational emissions created by fuel combustion or industrial processes.

Scope 2 – Indirect emissions created from purchased electricity.

Scope 3 – Indirect emissions from other sources not under direct control of the company (supply-chain operations).

► *Data*

The lack of availability and the poor quality of emissions data can pose a significant challenge to any carbon management initiative, but focusing on the data that is available can help bridge this gap.

If your supplier currently has emissions data at all, it is not likely to be at the level of detail you are looking for. A recent AMR Research study¹⁰ found that only 54% of surveyed companies are tracking GHG emissions and only 34% make this information publically available. Determining the data needed to satisfy regulatory requirements is evidently not easy; fewer than 10% of AMR respondents indicated that this was a straightforward task. Scope 3 activities (see side bar), as you might expect, are the least well tracked.

The Greenhouse Gas Protocol Initiative¹¹ is a partnership between the World Resources Institute (WRI) and World Business Council for Sustainable Development (WBCSD). Their GHG Protocol’s Product and Supply Chain Initiative is aimed at developing a set of international standards for calculating and managing product and supply chain wide GHG emissions. Until this initiative is complete, we may gain insight into future Supply-Chain legislation from PAS2050¹², developed by the UK’s British Standards Institute.

PAS2050 breaks supply chain data requirements into two types: activity data and emissions factors. Activity data is the amount of energy used during a product’s life cycle, emissions factors are then used to extrapolate the amount of emissions per unit.

PAS2050 also breaks emissions data down into two source categories, primary and secondary. Primary data are the result of direct measurements, specifically related to a product. Secondary data is the result of external measurements not necessarily related to the specific product; this might be government provided industry data for example. Primary data is preferred, and is in fact required for the enterprise itself and its primary supplier, but secondary data will likely be used further down the supply chain.

Prioritizing the GHG initiative on a key product, supplier, or component can also help to minimize the burden associated with gathering data. Combining the detailed data from these prioritized efforts with the data derived from the set of assumptions ultimately may prove to be satisfactory in the long run or at least until more accurate data becomes available.

► *Uncertainty*

Uncertainty surrounding data, policy, and technology can contribute to an unwillingness to invest in rigid enterprise level tools. Flexible tools will be needed to minimize this risk and allow for many different types of ad hoc data from many suppliers.

10: Stephen Stokes, Kevin O’Marah, “The New Age of Carbon,” AMR Research. Monday, June 29, 2009. <http://www.amrresearch.com/content/view.aspx?compURI=tcm:7-43922>

11: The Greenhouse Gas Protocol (GHG Protocol) is the most widely used international accounting tool for government and business leaders to understand, quantify, and manage greenhouse gas emissions. <http://www.ghgprotocol.org/>

12: The Carbon Trust and Defra have co-sponsored the publication by the British Standards Institution of PAS 2050, the product carbon footprinting standard. <http://www.carbontrust.co.uk/carbon/briefing/pre-measurement.htm>

Despite the recession, political pressure is building, and in fact much of the stimulus spending aimed at limiting the recession is intended to help green initiatives.

▶ **Current economic climate**

There is a natural tendency to limit investment during a recession, but despite the recession, political pressure is building and in fact, much of the stimulus spending aimed at limiting the recession is intended to help green initiatives. Finding ways to capitalize on this stimulus spending could make this a good time to invest.

FOCUS ON THE SUPPLY CHAIN

It has been established that companies need visibility of their upstream carbon emissions. According to separate studies done by McKinsey&Company¹³ and NSU International and Trucost Plc¹⁴ it is estimated that between 40 and 60 percent of manufacturers' carbon emissions reside in their supply chains. This number climbs to 80% for retailers due to more reliance on transportation related fuel costs.

Get the Best Tool for the Job

Selecting the right tool for the job is always essential and the case is no different when selecting a tool to help manage carbon emissions in the supply chain. Given the certainty of changing policies, evolving data sets, and new technologies, supply chain tools need to have a few key characteristics to be successful.

▶ **Data Flexibility**

Tools need to be able to accommodate a wide range of data types; from detailed primary level carbon emissions data from top tier suppliers, to secondary data sources based on assumptions and sent on Excel spreadsheets. Additionally, this supplier data may be evolving (improving) as suppliers take on their own carbon initiatives and add detail to the information they provide. Very importantly, these disparate data sources will need to be easily integrated into one meaningful view.

▶ **Supply Chain Integration**

Carbon emissions data should be seamlessly integrated with current supply chain data. These new data models will need to treat carbon emissions as an additional cost associated with a part, activity, or a source. Ideally, this data will include all production facilities and first tier suppliers.

▶ **Scalability**

Processes and tools should be built around the assumption that carbon initiatives will be completed in stages as suppliers take the necessary time to prepare their data sources. Depending on data availability, data quality, and importance, multi-enterprise corporations may wish to load data by site, by supplier, or by a specific product. Although time delays should be expected here, there can still be valuable analysis and action taken along the way as additional stages are completed.

13 : Chris Brickman, Drew Ungerman. "Climate Change and Supply Chain Management," *McKinsey Quarterly*, July 2008. http://www.mckinseyquarterly.com/Climate_change_and_supply-chain_management_2175

14: Dr. James Salo, Liesel van Ast, Sarah Wainwright, "Carbon Emissions - Measuring the Risks: An Analysis of Greenhouse Gas Emissions and Costs," Trucost Plc. 2009. http://www.nsf.org/business/sustainability/SUS_NSF_Trucost_Report.pdf

Integrating carbon emissions data with existing supply chain data will allow for meaningful cost benefit analysis.

► *Simulations*

Developing a carbon footprint view of a product is not an insignificant undertaking and for many companies this may be the ultimate goal. However, these companies will be missing out on the cost-saving and revenue generating opportunities that exist if they were to take the next step and simulate multiple action alternatives. Companies currently running supply chain simulations will instinctively apply this same technology toward GHG emissions. Emission data from multiple sites and suppliers will be integrated into an existing database putting powerful “what-if” capabilities directly into the hands of people at every level of the supply chain.

Simulation Scenario Examples

Purchasing and Planning

Planners can be given the ability to see the increased emissions costs associated with expediting an order. Buyers can be provided with the ability to compare the emissions impact of multiple part sources; potentially selecting a more expensive locally sourced part in order to lower emissions.

Product Management

Product managers and industrial engineers could be given the opportunity to optimize their products’ carbon utilization; potentially selecting more expensive components that reduce the overall footprint.

Supply Chain Management

Order policies, supplier selection, part substitution parameters, and transportation decisions, to name a few, could all be evaluated and optimized, taking carbon emissions into consideration as a cost factor.

Sales and Operations Planning

S&OP Directors could be given the ability to analyze changes in carbon emissions as an additional cost factor when considering the acceptance of a proposed change to a sales forecast. Companies falling under cap and trade schemes will take this a step further and consider the revenue opportunities from selling unused carbon allowances.

► *Metrics*

Working seamlessly and instantaneously within this simulation framework should be the ability to simply see the overall carbon impact of your decision relative to other supply chain metrics. This impact could be as simple as a one number metric showing a company’s carbon intensity. Integrating carbon emissions data with existing supply chain data will allow for meaningful cost benefit analysis using established metrics for comparison.

Tools should be extremely flexible and be put directly in the hands of the users; allowing them to use carbon emissions as an additional factor in the decision making process.

Risk Analysis

As important as it will be for companies to understand and manage their carbon emissions, it will be at least as important for them to understand the implications of global warming. Regardless of short term successes in reducing carbon emissions into the atmosphere, it is likely that the climate will continue to get warmer.

Companies will need to consider how global warming could impact their supply chain; assessing potential climate-related vulnerabilities such as new rainfall patterns, increased storm activity, higher prices for natural resources, and potential political instability and energy insecurity.

It appears that companies understand the need to begin integrating climate related risk factors, but to date, this has not widely occurred. According to the Economist 2009 Sustainability Report, only 24% of respondents were actively planning for weather related impacts to the supply chain. This statistic will likely increase as 75% of respondents in the same study agreed that companies were responding too slowly to climate associated risks.¹⁵

CONCLUSION

Supply chains will continue to be pressured to better manage their carbon emissions. This pressure will increase in scope and in intensity in the coming years. Companies that get ahead of the curve will be rewarded by investors and consumers alike. Companies that lag the curve run the risk of losing investor confidence, consumer trust, and falling behind in product development.

Tools and processes should be extremely flexible and simulation capabilities should be put directly in the hands of the users; allowing them to use carbon emissions as an additional factor in the decision making process.

Finally, despite best efforts, the Earth's climate is still expected to warm. Forward looking companies will be assessing these risks now and taking measures to minimize their exposure.

¹⁵ : "Countdown to Copenhagen: Government, business and the battle against climate change," A report from the Economist Intelligence Unit. Page 5. http://graphics.eiu.com/marketing/pdf/copenhagen/Sustainability_2009.pdf



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