Quantifying and Managing Supply Chain Greenhouse Gas Emissions

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Introduction

Analysis of greenhouse gas emissions at the global level, and at the level of key sectors of the economy, is well established. However these macro-scale models, designed to inform governmental policy and academic research, are poorly suited for use in managing supply chain activities. In contrast, methods for quantifying the greenhouse emissions of corporate supply chain activities are at an early stage. Supply chain leaders today face a rapidly evolving and often bewildering array of competing standards, approaches and regulations. They require practical approaches to quantifying greenhouse gas emissions, both for voluntary disclosure and management as well as to meet emerging reporting requirements and regulations. The purpose of this article is to briefly summarize emerging best practices for quantifying and managing the greenhouse gas emissions of supply chain activities, and the processes, organizations and stakeholders driving them forward. Steps for practical implementation and a case example are provided to demonstrate the approaches in action.

Methods for Quantifying Supply Chain Greenhouse Gas Emissions: It’s the Wild West Out There

At present there is a wide range of early stage approaches for quantifying the greenhouse gas emissions of supply chain activities. Among the many parallel and competing organizations and approaches, however, a small group of leaders is emerging. The most respected and influential is the Greenhouse Gas Protocol Initiative, a joint venture between the World Resource Institute and the World Business Council for Sustainable Development. The Greenhouse Gas Protocol Initiative is best known for the Corporate Standard, a broad, freely available framework for quantifying and reporting emissions currently used by over two-thirds of the Fortune 500. Reporting of greenhouse gas emissions estimates is led by the Carbon Disclosure Project, which provides the largest repository of voluntarily reported corporate greenhouse gas emissions, including data from roughly 2,400 corporations. The Carbon Disclosure Project provides the Sustainability Index reported in Google Finance, and is closely aligned with the Climate Registry, which works with government agencies to develop mandatory reporting standards.
first mandatory standard, the Environment Protection Agency’s greenhouse gas emissions program, is set to take effect in March 2011.¹

**The Greenhouse Gas Protocol’s Scope Standards**

A central concept of the Greenhouse Gas Protocol’s Corporate Standard framework for quantifying supply chain greenhouse gas emissions is the concept of “scope” of emissions measurement. To date, three levels of “Scope” have been specified:

<table>
<thead>
<tr>
<th>Scope 1</th>
<th>Emissions from sources directly controlled by the company (e.g. vehicles and manufacturing facilities)</th>
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<tbody>
<tr>
<td>Scope 2</td>
<td>Scope 1 plus emissions associated with the generation of electricity and other utilities consumed by the company</td>
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<tr>
<td>Scope 3</td>
<td>Scope 1 and 2 plus emissions from all other activities that are an indirect consequence of the company’s activities, such as employee commuting and disposal of company waste</td>
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**Table 1: Evolution of Greenhouse Gas Protocol’s Definition of Scope of Emissions**

The evolution of Scope 1, 2 and 3 represents a clear trajectory toward a comprehensive view of the greenhouse gas emissions of a company’s supply chain activities. Additional enhancements currently under development will add the greenhouse gas emissions generated over the lifecycle of vehicles, equipment and facilities, including their manufacture, maintenance, and disposal.

While a comprehensive view of an individual company’s emissions is obviously valuable, when aggregating emissions across companies it is important to avoid double counting. For example, one company’s Scope 1 emissions – such as those of a trucking company or a data center – are Scope 3 emissions of their customers.

**Turning Emerging Standards into Operational Processes**

The emerging standards for reporting greenhouse gas emissions described above provide a set of guidelines for quantifying and reporting the greenhouse gas emissions of supply chain activities. The next step is to build these standards into the operational processes and software companies use to manage their supply chain activities.

A number of for-profit companies provide software and consulting services to help fill this gap. Examples include Business for Social Responsibility, which provides consulting services, and

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¹ Starting in March, facilities that emit 25,000 metric tons or more of carbon dioxide or equivalent must submit annual reports to the EPA. The primary industries affected by this reporting requirement include landfills, pulp and paper mills, natural gas suppliers, cement production, and petroleum refineries. Industries exempt from these new reporting requirements are electronics manufacturing, ethanol production, food processing, sulfur hexafluoride from electrical equipment, underground coal mines, industrial landfills, and wastewater treatment.
SAP, which offers sustainability software. While consulting can help establish processes, it clearly cannot support ongoing management of operational activities. Although software can, most companies are reluctant to adopt and maintain additional software models of their supply chain activities solely to support quantification and management of greenhouse emissions.

Given the limitations of specialized consulting and software solutions, consensus is emerging that the best approach to quantifying and managing greenhouse gas emissions is to incorporate them as an additional “layer” or capability in the software tools currently used to manage core supply chain activities, such as transportation and manufacturing planning and execution tools. Doing so provides a single, integrated view of the performance of core supply chain activities, and makes it possible to manage greenhouse emissions jointly with other core operating and financial metrics.

The key data required to incorporate greenhouse gas emissions in existing software tools are estimates of the emissions of specific supply chain activities, such as particular manufacturing processes or transportation between city pairs. Because it is difficult to profit from the sale of parameter estimates of this kind – relative to software or consulting services – the primary source for these parameters is likely to be the government and nonprofit organizations (listed above) currently leading the development of methods for quantifying the greenhouse gas emissions of supply chain activities.

A Case Study of Leadership: Smartway and Transportation Greenhouse Gas Modeling

A leading example of an organization driving both reporting standards and detailed estimates of the greenhouse gas emissions of specific supply chain activities is Smartway, a unit of the Environmental Protection Agency. Smartway’s mission is to research and drive adoption of best practices for managing greenhouse gas emissions in freight transportation. Smartway provides a range of data, tools and services, and also brings shippers and carriers together in a neutral environment to foster collaboration and collective action. Participating carriers provide detailed information about their fleet and operations to Smartway, and can earn Smartway’s certification (similar to EnergyStar certification for household appliances) by adopting best practices for reducing their greenhouse gas emissions. Smartway makes carrier emissions information available to shippers, giving them a detailed, high quality, and free source of data to use in their carrier choice decisions. Shippers that use Smartway certified carriers receive Smartway certification for their transportation practices, providing an incentive for them to use efficient carriers, and creating a market-based incentive for carriers to improve the greenhouse gas efficiency of their operations.

Smartway’s repository of detailed emissions data by fleet and vehicle type provides an excellent source of the information required to capture a company’s transportation greenhouse gas emissions in its supply chain transportation software. Because it is a non-profit, governmental...
organization, Smartway’s data is free, and is likely to be reliably available on a long-term basis. Since the EPA also defines the regulatory reporting requirements for greenhouse gas emissions in the U.S., Smartway’s data has the added benefit of ensuring compliance with those regulations.

**Beyond Transportation**

Governmental and other non-profit organizations that provide greenhouse gas emissions reporting standards and data for supply chain activities other than transportation are in earlier stages of evolution, but are expected to progress rapidly in the coming years. Transportation modeling is a natural early leader due to its relatively standardized nature, and because most companies require transportation.

**Summary**

While still evolving, standards for quantifying the greenhouse gas emissions of supply chain activities are maturing and stabilizing. As a result, focus is now shifting from standards definition and accounting to development of practical methods for implementing available standards in the day to day management of supply chain activities. While a range of consulting and specialized software tools are available, the emerging best practice in implementation is to add greenhouse emissions parameters to the software tools currently used to manage supply chain activities. This enables companies to operate with a single, integrated framework that captures all relevant dimensions of the performance of their supply chain activities. The detailed parameters required to incorporate the greenhouse gas emissions of transportation activities are currently available from organizations such as Smartway. Other non-profit sources of the parameters required to implement the same approach in other supply chain activities are at earlier stages but are expected to follow, enabling a high quality, low cost, long term solution for the management of greenhouse gas emissions in corporate supply chains.

**References**


