

Step #1: Know Your Carbon Exposure

Every company should analyze its GHG emissions profile throughout the value chain. This is a fundamental analysis for anticipating your company's vulnerability to climate change regulations and market shifts that result. Some companies may find only modest impacts from carbon constraints; some may find that they are severely disadvantaged, and some may find that carbon constraints pose an opportunity. Do not make assumptions. Your analysis can yield surprising results. Shoe manufacturer Timberland was surprised to discover that the largest carbon impact of its product came not from the transportation of its materials and final product (as had been expected) but from the manufacture of its raw materials. In other words, the major carbon impact of its product came before even the making of the shoe. The point is that you cannot know how your business model will be impacted without (a) identifying the sources, types, and magnitude of GHG emissions your company produces; (b) assessing the vulnerability of your business lines to constraints on those emissions; (c) knowing whether you might be

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a buyer or seller in carbon markets; and (d) comparing your vulnerability to your industry peers.

Develop an Emissions Inventory.

An emissions inventory is an essential first step in assessing your carbon footprint. This involves deciding what to measure, how to measure it, how to store and analyze that data once collected, and then where to register it for external verification.

What gets measured gets managed. For the first challenge of determining what to measure, the World Resources Institute (WRI) and World Business Council on Sustainable Development (WBSCD) have co-developed a Greenhouse Gas Protocol Corporate Accounting and Reporting Standard that has become the most commonly used protocol to account for emissions. It classifies emissions into three categories:

- **Scope 1:** Direct emissions
- **Scope 2:** Indirect emissions from the use of purchased heat, steam, or electricity
- **Scope 3:** Other indirect emissions from upstream and downstream sources

Direct emissions come from sources owned by the reporting company and generally include emis-

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sions from on-site production processes, the direct combustion of fossil fuels in boilers and furnaces, and on-site power generation. Indirect emissions come from purchased energy, emissions generated by the use of the company's products, material transport, business travel, and commuting.

One additional area from which the footprint can be measured is biological and terrestrial carbon sequestration. The former involves planting trees to store carbon; the latter involves pumping CO₂ underground, a practice common with many oil companies for increasing well yields.

In order to understand your full exposure to climate change regulations, you should conduct a full emissions audit that includes all direct and indirect emissions. But, as emissions trading regimes become established around the world, you can see that they differ on which emissions will be counted. Phase I of the EU ETS, for example, covers 11,500 installations in principal sectors (approximately 46 percent of EU CO₂ emissions) and measures only emissions from direct combustion. Companies registered with the voluntary Chicago Climate Exchange (CCX), on the other hand, measure their footprint as all direct combustion from their operations plus indirect emissions from the electricity, heat, and steam they purchase. Other sources, such as business travel, are not counted in their footprint calculations.

Emission measurement tools and techniques. While determining what emissions to measure may seem to be a daunting task, the actual process of measuring them can be even more daunting. Some companies measure actual emissions, while others estimate emissions using fuel-based calculations (based on methodologies such as those created by WRI/WBCSD, the EU ETS, the U.S. Department of Energy (DOE), CCX, and others). These methodologies use the energy (BTU, or British thermal unit value) of the fuel consumed multiplied by its carbon intensity (pounds of CO₂ emitted per million BTU). The decision to measure actual or calculated emissions depends, in part, on the complexity of the task. Companies with many emission sources or extremely hostile stack environments (that degrade equipment placed within them) prefer to avoid on-site measurement, owing to the cost of purchasing, installing, maintaining, and replacing continuous emissions monitors (CEMs). Conversely, some companies find the paperwork challenges of collecting and reconciling fuel invoices to obtain an estimate of CO₂ emissions from their fuel input to be overwhelming. There is no simple answer.

Data management systems. After collecting the information, the next challenge is storing and analyzing it. Most companies have developed new information

systems to track ongoing GHG emissions. These can be quite complex, but make a difficult task manageable. Alcoa, for example, has developed an effective centralized system that includes detailed process and energy consumption information for forty-one facilities worldwide, including four power generation facilities, nine alumina refineries, and twenty-six smelters. The system uses the EU ETS methodology to calculate emissions and sweeps databases every evening to download process and production data. Designated individuals at each plant are then responsible for manually entering energy-consumption data on a monthly basis, and reminders are issued automatically to ensure that data for all facilities is available as soon as possible at the end of each month. This information is aggregated for analysis by headquarters and the individual facilities.

But Alcoa's system is not the norm. Many companies are still searching for data management tools that efficiently and effectively gather emissions data from facilities around the world and link it with integrated performance measurement systems like SAP, allowing them to link emissions reductions to financial measures. Even companies that have a lot of experience tracking emissions see room for improvement. This is a perfect business opportunity for companies that develop expert systems.

Register your emissions. Finally, to be positioned to gain credit for action you take on reducing your emissions, you must set a verifiable benchmark by registering your reductions through a variety of mechanisms, such as the Energy Information Administration's (EIA) 1605(b) reporting system, the EPA's Climate Leaders program, the World Economic Forum's GHG Registry, the Climate Registry, the California Climate Action Registry (CCAR), and CCX. It can be confusing to decide which system is best, as there is little standardization among these programs. (The Climate Registry has started a multistate effort at standardizing GHG registry procedures to measure, track, verify, and publicly report emissions.) But the important point is that your emissions be verified *someplace*. While there are several options for emissions registries, many have similar characteristics, including third-party verification. It makes sense to become involved in a registry that is geographically close to your primary operations, but the most important issue is that you begin learning the process of emissions monitoring and verification for registries. Whichever mechanism is used, registering your company's emissions is a critical step for early adopters.

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Gauge Risks and Opportunities to Operations, Products, and Service-Lines.

Emissions alone do not reveal your company's exposure to carbon constraints. You must also consider potential impacts on product and service lines. How will your operations and sales be affected—both positively and negatively—by climate-change-related factors that place a value on your carbon emissions? And, as a result, how will such factors alter your competitive positioning? Companies generally begin this assessment with a focus on risk management and bottom-line protection. Will the economics of certain borderline facilities be thrown into the red? Will the price of certain products be increased to a point beyond which reasonable margins can be gained? Can these effects be mitigated by searching for process efficiencies or product alterations?

But while risk management can be a starting point for addressing climate-related vulnerabilities, with time and experience companies should shift their climate-related strategies to emphasize business opportunities and top-line enhancements. In fact, the mere presence of risk from GHG-intensive operations, products, and services signals the potential for business opportunities based on GHG efficiency. Goldman Sachs has developed a model that includes three

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ways in which value can be added to the corporate strategy through climate change initiatives: protecting reputation, enhancing competitive position, and developing new products. You need to assess whether and how demand for your current and future product and service lines may be enhanced by climate-related developments. The most effective climate-related strategies connect GHG reductions with your company's core business strategy. In the end, the entire question of carbon vulnerability is an assessment of how a price for carbon alters the economics of your business models, and then how it affects the models of your competitors.