Dan Peterman (American, born 1960)

Left
Peterman Business Miles, October 1994–Present (March 1996)
1996

Right
Peterman Business Miles, 1992
1992
Tree trunk sections

This project links a year of car driving—and emitting carbon into the atmosphere—with a century of carbon stockpiling in the form of the accumulated carbon content of a tree trunk.

An estimate was made of the carbon emitted into the atmosphere during the course of a year as a result of the artist's automobile use for business purposes. The artist then selected tree trunks with an equivalent carbon content.

Preparing for a **low-carbon** future

Tackling carbon exposure is more than good environmental stewardship; it could also protect a company's share price in the near term and create a long-term competitive advantage.

Christoph Grobbel, Jiri Maly, and Michael Molitor

Although corporate liability for carbon emissions has been overshadowed by louder calls for governance reform, it has risen inexorably on the shareholder's agenda (Exhibit 1, on the next page).[1] Large institutional investors, such as Calpers and the pension funds of New York State and New York City, are pushing companies to report their carbon "footprint"—the total amount of carbon dioxide that they and their suppliers emit—and to define their risk exposure to regulations that limit emissions. The Carbon Disclosure Project,[2] a group representing institutional investors managing $10 trillion in assets, has sent questionnaires to 500 of the world's largest companies (including airlines, automobile manufacturers, insurers, power generators, retailers, steelmakers, and technology companies) asking them to explain their emissions policies and strategies. The project then publicizes the response (or lack of one) for investors to note.

This intensifying level of scrutiny isn't simply a call for environmental stewardship, although that might play a role. Rather, it is born of concern that over the next 5 to 15 years the way a company manages its carbon exposure could create or destroy shareholder value. The companies with the most to lose, at least initially, are those whose production processes generate a lot of greenhouse gases, particularly carbon dioxide. Businesses

[1] The corporate liability for carbon emissions may include a legal liability, given the possibility of more lawsuits such as the one filed in July 2004 by eight US states and New York City to force five electricity companies to reduce their emissions. This article, however, focuses on the financial risks of emissions.
[2] See www.cdproject.net.

EXHIBIT 1

Under pressure

Global

Carbon Disclosure Project	**Equator Principles** (World Bank and International Finance Corporation)	**United Nations Environment Programme (UNEP) Finance Initiative**
• 95 institutional investors representing >$10 trillion in assets • Requesting disclosure of greenhouse gas emissions from 500 largest companies in world (by market capitalization)	• 27 institutional investors accounting for ~80% of worldwide project financing • Ensuring social responsibility and environmental soundness in project financing	• 220 institutional investors • Setting up globally recognized principles for responsible investment

United States/Canada			*Europe*
Coalition for Environmentally Responsible Economies (Ceres)	**Investor Network on Climate Risk (INCR)**	**US lawsuits**	**Institutional Investors Group on Climate Change**
• Coalition of investment funds, public-interest groups • Members represent >$400 billion in assets • Helping institutional investors assess risks/opportunities of climate change	• Members represent $700 billion in assets • Increasing financial markets' awareness of climate risks	• 8 states and New York City sued 5 electricity generators[1] to reduce CO_2 emissions	• 24 institutional investors/ pension funds representing >€700 billion in assets • Providing research on sectors at high risk from climate change

[1] American Electric Power, Cinergy, Southern, Tennessee Valley Authority, and Xcel Energy, which own or operate 174 hydrocarbon-based power plants in 20 US states, account for 10% of total US CO_2 emissions.

Source: United Nations Framework Convention on Climate Change (UNFCCC); organizations' Web sites; McKinsey analysis

(such as airlines, auto manufacturers, and logistics companies) that make or rely on products that generate carbon dioxide must also be wary (see sidebar, "Managing product emissions," on page 90). Even companies that fall into neither category must pay close attention. Rising input costs—for energy or transportation, say—will affect companies of every stripe, from retailers that consume energy in their stores to consumer product companies that design packaging, and investors will increasingly hold them responsible for managing emissions. Managers who fail to respond to calls for more transparency and better planning will face greater public censure or even charges of breach of duty, say shareholder activists. They might also find the share price of their companies discounted in capital markets.

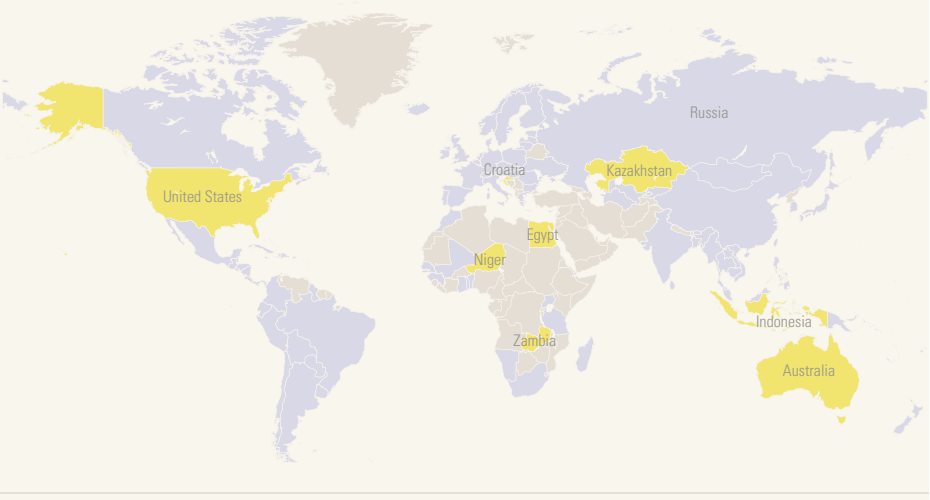
The new pressure may come as a jolt to executives, many of whom are unsure how to respond in a climate of regulatory uncertainty. The United Nations' Kyoto Protocol, which requires industrialized countries to reduce greenhouse gas emissions to about 95 percent of their 1990 levels by 2012, went into force with Russia's ratification in late 2004. But several key players—particularly the United States and Australia—haven't signed on (Exhibit 2). In the absence of universal ratification, individual governments at the supranational, national, regional, and state levels are coming up with their own regulations on carbon emissions: the European Union's Emission Trading Scheme comes into force in January 2005, for example,

and state and regional governments in Australia, Canada, Japan, the United States, and elsewhere are also setting new rules. The particulars differ, but the bottom line is the same: emitting carbon and other substances will become more expensive, and shareholders want to know how executives plan to manage these costs.

Although all companies will experience the consequences of increased regulation, the big emitters will be the first to feel the pressure. Companies in the cement, oil-refining, power, pulp and paper, and steel industries will

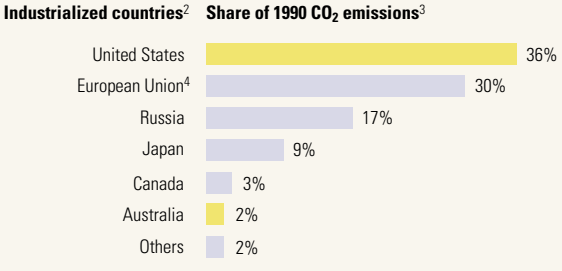
EXHIBIT 2

Kyoto holdouts



Ratification

The Kyoto Protocol requires ratification by enough industrialized countries[2] to account for 55% or more of total 1990 emissions for industrialized countries (pending).



[1] Liechtenstein, Monaco, and St. Vincent and the Grenadines not shown on map.
[2] Includes (as defined by Kyoto Protocol) members of Organisation for Economic Co-operation and Development (OECD) and countries with economies in transition, such as Baltic states, Russia.
[3] Figures do not sum to 100%, because of rounding.
[4] Includes new member states as of May 2004.

Source: United Nations Framework Convention on Climate Change (UNFCCC)

likely soon be subject to cap-and-trade schemes[3] in Europe, North America, and Japan—and, eventually, in the developing world—as countries and regions try to meet the goals of the Kyoto agreement. When programs come into force, executives in these industries will have to weigh the trade-offs of maintaining their current emissions, buying allowances and credits, or reducing their carbon output and selling their allotted credits. Understanding the cost of emissions in these industries will in turn help executives from others to identify areas in their own supply chains where costs are likely to rise. Companies in all industries, whether or not they emit carbon in their production processes or produce goods that emit carbon, should set up new tracking and reporting processes to keep shareholders informed. Many companies will also need to work with regulators to shape the rules and make them as clear as possible.

The economic impact

For big emitters, the direct costs of emission credits are relatively easy to understand: in a cap-and-trade scheme, companies that exceed their allotted level must purchase additional credits or allowances at open-market prices from their competitors.[4] Companies thus have an incentive to cut their emissions, and the incentive grows if they reduce emissions below the cap, because they can then sell surplus credits to companies that are over the limit. Decreasing the need for credits—through smart investments in cleaner technology, for example—will thus become an important strategic consideration, as will using import barriers or other means to fend off competition from companies (often in less regulated countries) that have lower emission costs.

We studied the likely impact of regulation and emission costs on the economics of several carbon-intensive industries in Europe[5] and found surprising differences among them—differences that are also likely to characterize other regions. Carbon regulation, for example, will raise costs for all European steel producers, but those that face greater competition from cheaper imports, such as makers of flat-steel products (used for car bodies), could suffer more than makers of long products (used in construction), which are less exposed to foreign substitutes. Cement manufacturers might actually benefit from carbon regulation: their emission costs will mostly be covered by allocated allowances, and since the threat of imports in cement is fairly low they will be able to pass on to customers

[3] For more details, see Enrique de Leyva and Per A. Lekander, "Climate change for Europe's utilities," *The McKinsey Quarterly*, 2003 Number 1, pp. 120–31, particularly the sidebar, "How does a cap-and-trade scheme work?" (www.mckinseyquarterly.com/links/14900).

[4] In the EU's scheme, most companies will receive almost enough credits to cover their current emissions, but there will be a small shortfall to encourage reductions. These allowances are likely to decrease over time, so the incentive to invest in carbon-abatement technologies will become stronger.

[5] The EU's Emission Trading Scheme targets five industries: cement, oil refining, power, pulp and paper, and steel. Elsewhere, regulations are likely to focus on these and other industries, including aluminum.

any costs they do incur. Some cement producers could do even better by investing in a more carbon-efficient process that uses slag, a by-product of steel production. In fact, the value of slag is likely to rise owing to this demand, thereby helping to offset the cost of carbon regulation in the steel industry.

Oil refiners face a mixed prognosis. Reduced demand for common residual fuel oil (which is used to generate power in some parts of the world and emits more carbon dioxide than do other fuels, and far more than natural gas) should help keep down the price of heavy crude oil. That could benefit the more complex refiners, which can convert it into motor fuels. However, a drop in demand for petroleum would hurt the entire industry.

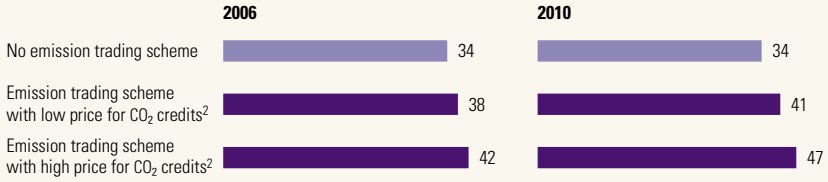
These dynamics show why companies in industries whose production processes emit a lot of carbon should compare their competitors' exposure to carbon caps with their own. As they do so, many will revisit their strategies. Some oil companies, for instance, are going to find that certain investments—such as updated refinery technology to convert cheaper, heavier crude oil into motor fuels—will begin to look attractive. Other types of companies will look hard at whether they can go on conducting business as usual: for example, steel mills using basic oxygen furnaces that emit high levels of carbon dioxide to produce flat and rolled products could be better off shutting down production and selling carbon credits.

For companies in all industries, the efforts of big emitters to comply with and thrive under cap-and-trade schemes will have a number of implications. One is that the price of energy, insurance,[6] and carbon-intensive commodities

EXHIBIT 3

Caps ignite energy prices

Forecast average wholesale electricity prices for European Union,[1] € per MWh



[1]Includes new member states as of May 2004.
[2]Availability of emission credits will affect prices and depends on factors such as how much companies reduce their emissions and how many credits are created; low CO_2 credit price (plentiful credits): €8 per ton of CO_2 in 2006, €15 per ton of CO_2 in 2010; high price: €12 per ton of CO_2 in 2006, €25 per ton of CO_2 in 2010.

Source: McKinsey power simulation model

[6]Insurance companies are concerned about rising losses related to climate change. The United Nations Environment Programme and the reinsurer Munich Re predict that losses from extreme weather events, such as floods and heat waves, will grow from $55 billion in 2003 to $300 billion in 2050.

such as steel, processed minerals, and paper is likely to rise as regulators impose caps on greenhouse gas emissions (Exhibit 3, on the previous page). Another is that executives could find that carbon regulation inspires new growth opportunities, which might arise in low-emission versions of familiar products (advanced diesel engines or natural-gas power generation, say). The opportunities could also involve emerging substitute technologies, such as carbon sequestration (removing emissions from the production process and then storing them underground or injecting them into oil and gas wells to improve yields) and advanced technologies that convert coal into cleaner-burning liquid or gas fuels. Some companies might consider changing their portfolios to sell products with a lower carbon footprint, though such analyses are complex. More greenhouse gases are emitted during the manufacturing processes of cars made of aluminum rather than steel, for example, but these cars, being lighter, burn less fuel and so generate less carbon dioxide over their lifetimes.

Move to reduce emissions

Given the high probability that heavy carbon emitters, depending on where they operate, will sooner or later become subject to cap-and-trade regulations, and the intense interest of shareholder groups in the meantime, these companies should immediately try to cut emissions by taking "no-regrets" moves. Some are straightforward: fixing leaks, reducing

Managing product emissions

Carbon regulations have so far focused mostly on the direct sources of emissions created when goods are produced or power is generated. But products—such as auto, airplane, and other engines—that emit carbon dioxide when they are used are also a big part of the carbon equation. Most of them are employed in the transportation sector, which, in addition to airlines and automotive companies, encompasses trucking, railroads, post and parcel services, forwarding and logistics, urban transit, and travel and tour operators (including rental-car fleets). All in all, this sector generates about 20 percent of the world's greenhouse gas emissions, and its share is growing more rapidly than those of other sectors. Since carbon-trading schemes for hundreds of millions of car owners would be difficult to implement and manage, regulation in this sector will probably focus on fuel-efficiency requirements and fleet reductions. New rules in California, for example, aim to reduce emissions from commercial fleets and other passenger vehicles by 30 percent as of 2017, and the United Kingdom bases taxes on corporate cars solely on their carbon dioxide emissions.

Executives in any sector (including agribusiness and forestry) whose product emissions are a concern will have to cope with regulations to reduce emissions from products and from the delivery of services. To meet fuel-efficiency product emission targets, for example, automobile manufacturers will need to reconsider their product mix and customer-segmentation plans and to invest in new automotive technologies. Licensing and partnerships

waste, and keeping up with preventive maintenance. But before executives decide on any complex and long-term move, they will have to compare the cost of two alternatives—reducing emissions or buying more credits—by factoring the cost of carbon emissions, as a financial variable, into their capital-investment planning. Heavy emitters, like all other companies, will also need a sourcing strategy to manage the impact of carbon regulation on the cost of key inputs, such as electricity.

In addition, executives will have to understand where the emission boundaries fall within the value chains of their companies and how they can make choices that minimize their exposure to carbon-induced risk. An aluminum producer, for example, can reduce its own emissions by switching to processes that emit lower levels of greenhouse gases or use less electricity. It can also influence emissions further up the value chain by purchasing either electricity from a "green" power generator or the emission credits it needs from the market (thereby creating a demand for other companies to generate those credits) and by providing incentives to suppliers or even funding their investments in cleaner processes. The company might take these steps not out of altruism but because it could then label its aluminum "carbon reduced" or "carbon free." Eventually, consumers might demand carbon-reduced cars because banks and auto insurers, spurred by a desire to reduce the damage that climate change wreaks on their own portfolios, offered better terms for such vehicles.

will become increasingly important for acquiring new technology and developing products and revenue streams. Toyota Motor, for example, is licensing its Prius hybrid-engine technology to Ford Motor for a relatively small sport utility vehicle, the Escape, and Renault is supplying Nissan with diesel engines.

Airlines have fewer options. Aircraft engines are already very efficient, but airlines could reduce their emissions at airports by improving their aircraft-taxiing procedures and managing auxiliary power units more effectively. Even so, an expected rise in air traffic throughout the world, especially in Asia, will outweigh minor improvements of this kind as well as new aircraft designs. Airlines have thus far avoided carbon regulation, and in many cases jet fuel is taxed lightly or not at all, unlike fuel for cars and trains. But that free ride could end: the EU wants to include airlines in its Emission Trading Scheme after 2008.

Closer scrutiny should prompt companies in the transportation sector to work closely with regulators to shape the rules that will affect it. Auto manufacturers, for example, might want to seek tradable credits for any low-emission vehicles they produce, either to use against their own manufacturing emissions or to sell to other companies. And fleet operators, including big logistics companies such as FedEx and UPS, should seek to earn credits for running low-emission autos and trucks, thereby further increasing demand for low-carbon vehicles and generating even more credits for auto manufacturers.

Less heavy emitters will also want to evaluate the amount of carbon they emit and consume. In 2002 Colgate-Palmolive, for example, began estimating the emissions (mostly generated by purchased electricity) from its manufacturing and research facilities and asked a third party to verify the findings. It also redesigned its packaging to reduce the amount of fuel needed to transport finished products.

As a company works toward a sustainable approach to the carbon issue, it develops an internal culture and skills that help it meet regulations when they are implemented, thus potentially gaining a competitive advantage. In 2004 Shell Canada and its partners, for instance, won approval for expanding operations in the oil sands of Athabasca, in Alberta. The reason, in part, was that the company had already improved on environmental targets set by regulators and was more experienced than its competitors at communicating a project's environmental impact to community leaders and at involving them in its decisions.

Track and report financial risks

Most companies, regardless of their carbon footprint, will have difficulty responding to shareholders' calls for more transparency and accountability on carbon emissions, especially because reporting standards for carbon monitoring are not well defined. Almost every company above a certain size, in nearly every industry, must learn how to account for the quantity of carbon dioxide emitted from or consumed by its business.

Financial analysts, who have been calling for more transparency, are helping to develop global reporting standards to aid in the rating of companies. In Europe's utility sector, for example, several new variables make it possible to measure carbon emissions against production or revenue,[7] although these variables are still new and their relationship to the more common financial metrics is untested. Other efforts to quantify the risk induced by carbon emissions include the investment guidelines that the finance initiative of the United Nations Environment Programme will publish in the summer of 2005 and the Goldman Sachs Energy Environmental and Social Index for leading oil companies. The index includes five measures of climate change[8] and ranks companies accordingly, but it offers only a general link to corporate valuations. Ceres, a coalition of US companies, investor groups, and environmental organizations, uses a similar method to analyze oil refiners. These approaches highlight differences among companies, thereby helping to identify leaders and laggards, but have yet to quantify the connection between movement in the indexes and the

[7] Two gaining prominence are the carbon factor of the production portfolio and the revenue/profit exposure per carbon profile.

[8] Greenhouse gas targets and performance, greenhouse gas levels relative to gross cash invested, activity in emission trading, change in greenhouse gas levels, and investment in renewable energy.

long-term performance of a company's shares. Companies in heavy-emitting industries will probably be the first affected by standards for measuring carbon accountability. But executives from all industries should be involved in the development of these standards in order to ensure that they are efficient and that the accounting is logical.

Help shape regulations

Uncertainty about future regulations is the biggest risk in the carbon equation: executives need long-term assurances on credits and emission levels to factor them into plans for expensive capital investments. Both the Kyoto Protocol and the EU's Emission Trading Scheme set preliminary goals, but it is unclear what will happen thereafter.

Working to delay or derail regulations sends the wrong message to concerned shareholders and could leave management unprepared for inevitable changes in the regulatory environment and in the resulting industry economics. By helping to shape the regulations, executives can reduce the level of uncertainty and make the rules as clear and fair to their industries as possible. In Germany, for example, some chief executives in the power industry saw the Emission Trading Scheme as a threat to the financial health of their companies, which relied on coal and lignite to generate electricity. But by working with regulators, these executives won a four-year window of opportunity for transferring the allowances of the old plants to cleaner new ones, thus subsidizing their construction. Policy makers like the arrangement because the new coal plants emit less carbon dioxide than their predecessors, at a cost three to four times lower than that of heavily subsidized wind-power plants. Environmentalists like the almost 30 percent reduction in carbon dioxide emissions.

As heavy-emitting industries gird themselves to comply with cap-and-trade schemes, and as investor groups begin to pressure all big businesses to disclose their emission policies and strategies, companies in every industry must act preemptively rather than stonewalling or merely reacting to regulations. In this way, executives can show that they understand the risks from their companies' carbon footprint and are working to reduce the exposure. Q

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