Gain a lead over industry rivals by reducing your company's exposure to carbon

The green edge: Why carbon competitiveness matters

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Most CEOs are concerned about issues like global warming, sustainability and carbon emissions—they get the big picture. They attend industry forums, participate in the development of government policy and sometimes even chair industry efforts to influence the direction of policy. Many CEOs are also conscious of how green their company is, especially in terms of compliance with regulations, avoiding negative publicity from activist organizations and branding products and services to appeal to eco-conscious customers. However, few CEOs look at competitors within their industry and ask: How can I use carbon competitiveness to gain an edge over my rivals?

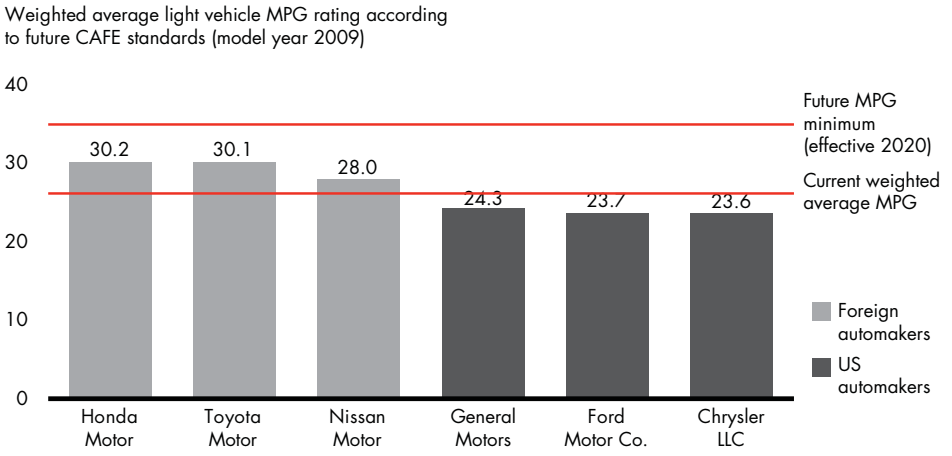
Increasingly, across industries, the relative size of the carbon footprint of a company will define one of its key comparative advantages within the industry. As governments around the globe regulate the emission of greenhouse gases with increasing severity in the next two decades, carbon dioxide (CO_2) emissions will become a financial liability, not just at the industry level but also at the company level. Carbon regulation will change the competitive landscape of many industries but will also fundamentally change the competitive standing of individual companies within the industry. Those CEOs who are not planning strategically for a carbon-regulated world may inadvertently put their company's future competitiveness at risk. Consider a few examples on why a CEO needs to monitor the industry-level impact of carbon regulation (see page 9), but then, simultaneously, also protect the individual company's interests versus the competition:

- For many utilities, even a modest regulatory regime for CO_2 emissions will result in annual liabilities well in excess of current profits. But some power companies will feel the pressure less from competition due to more efficient operations. Companies like Florida Power & Light Company and Entergy produce just 2.14 MT CO_2 and 1.71 MT CO_2 per 1,000 MW of installed capacity, respectively. In contrast, one of the largest US utilities produces 5.86 MT CO_2 per 1,000 MW of installed capacity.

- The US auto industry estimates that the new fuel efficiency standards proposed by the Obama administration will cost up to $100 billion. But independent of government regulation, foreign automakers have already stolen the lead on US auto companies within the US auto market by offering fuel-efficient vehicles well in advance of regulatory pressure (see Figure 1). In 2008, nearly two-thirds of foreign automakers' US sales consisted of cars that already met the regulation standards set for 2020. In contrast, just 5 percent of US carmakers' domestic sales met the standards. Further, within the US auto industry, some companies are better prepared than others. In the case of one US auto manufacturer, not a single car sold by the company in 2008 met the norms for 2020.

- The US Energy Information Administration estimates that oil and gas companies could pay $68 billion annually under the proposed cap-and-trade legislation. But that pain will not be spread evenly across the industry. For every barrel of oil that it brings to market, a current leading industry player emits more than twice the quantity of CO_2 as ExxonMobil.

Figure 1: Regulation standards for 2020: Automakers strive to raise the bar



	Honda Motor	Toyota Motor	Nissan Motor	General Motors	Ford Motor Co.	Chrysler LLC
US light vehicle unit sales (2008):	1,429K	2,218K	951K	2,955K	1,981K	1,453K
Light trucks sales as % of total:	39%	39%	37%	57%	62%	69%

Note: MPG ratings weighted based on each model's share of company total US light vehicle unit sales in 2008; current MPG ratings not available for 2% of GM, Ford, Chrysler models, 1% of Nissan models
Source: *Automotive News*, fueleconomy.gov

In our experience, companies need to examine their past before they can build relative carbon competitiveness in the future. Historically, companies acquired productive assets or built product portfolios under an older "carbon-free" environment. Within the same industry, therefore, each company has a unique carbon footprint—to manufacture the same product or deliver the same service. In such an environment, carbon regulation does not affect each company within an industry equally; instead, it has the potential fundamentally to change the rules of competition. A firm's competitiveness *within* an industry can therefore be severely impacted by legacy assets and products that are more CO_2 intensive than its competitors'. Or, as we prefer to think, the company that has lower CO_2 exposure than its competitors has a chance to strengthen its position dramatically within an industry.

Identifying vulnerabilities

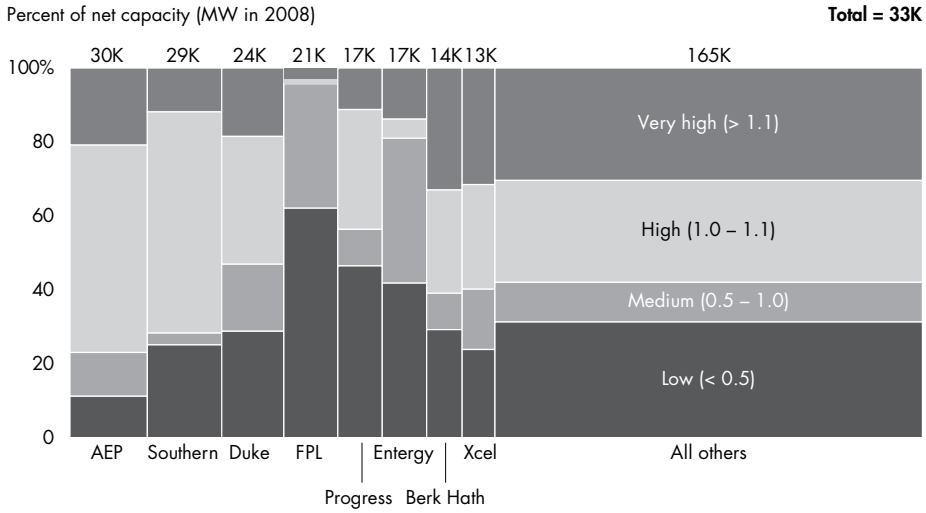
Most companies still struggle to assess their carbon exposure. In our work across industries, we find managements are surprised when they get down to reviewing their areas of carbon competitiveness. Sometimes, there is a vast difference between what a company perceives as its areas of vulnerability and the reality. Often, the challenge for most CEOs is to recognize that their vulnerability to carbon exposure can be from either *direct* emissions (that is, those emitted by the companies during their operations) or *indirect* emissions (those emitted during the combustion of their product) or both. In most industries, CEOs struggle for clarity on what affects their business more—direct or indirect exposure—and, therefore, they find it hard to benchmark their relative position compared with the competition, which might or might not have the same type of exposure due to different legacy assets. Consider

how in three industries, the relative carbon competitiveness of companies varies substantially within the industry:

Direct exposure: In the power generation business, companies can have a spectrum of direct CO_2 emission liabilities—based on each company's asset mix. Each company has a portfolio of power plants of varying fuel types and efficiency. To understand the range better, we divided the power plants into quartiles of CO_2 intensity as measured by the tons of CO_2 per megawatt-hour of electrical output: Very high (greater than 1.1 tCO_2/MWHe), high (between 1.0 and 1.1 tCO_2/MWHe), medium (between 0.5 and 1.0 tCO_2/MWHe), and low (less than 0.5 tCO_2/MWHe). Nuclear, renewable, and hydro power are all in the low category; the medium category is composed primarily of natural gas combined cycle plants; the high category is predominantly supercritical coal-plants; and the very high category is mostly subcritical coal plants.

Clearly, some companies like Florida Power & Light, Progress Energy and Entergy are better positioned than others to adjust to CO_2 regulations because they produce power through "cleaner" production assets (see Figure 2). For these companies, CO_2 regulations are likely to improve their relative cost position, and in certain deregulated markets, that improved cost position can even be translated into expanded market share. On the other hand, companies with a distinctively large mix of coal-fired power plants are fated to see their relative cost position get worse over time. If the carbon tax rises to more than $60 per ton, the operating costs of some of the largest utilities, for example, will increase by 70 percent and 90 percent, respectively. Such increases in operating costs represent profound changes to the power business and as such, management's capital deployment plans must start by considering their direct CO_2 exposure.

Figure 2: Power companies: Wide range of exposure to carbon regulation, based on asset mix



Source: Ventyx, Velocity Suite, 2009

Of course, in many cases, that isn't easy. CEOs who find themselves in a weak relative position due to their company's asset mix have limited options, and none is quick or easy: They can either change the asset mix, or retrofit the asset base or do both. These strategies are not mutually exclusive, but they require clear priorities and careful consideration of how much capital is deployed, the return on investments and the operating expense trade-offs.

Indirect exposure: Equipment manufacturers—such as the makers of automobiles, jet engines, power plants and chemical plants—are vulnerable to indirect emissions. As CO_2 emissions are taxed or priced through a cap-and-trade scheme, customers of equipment manufacturers will demand equipment that produces less CO_2 for a given amount of useful output. CEOs of these companies will soon see the demand for their CO_2-emitting products change dramatically. But what is less often discussed is how some equipment manufacturers will be better—or worse—off based on their product's carbon emissions. That is to say, the relative CO_2 intensity of each company's product portfolio will partially determine the future competitiveness of each company in the industry.

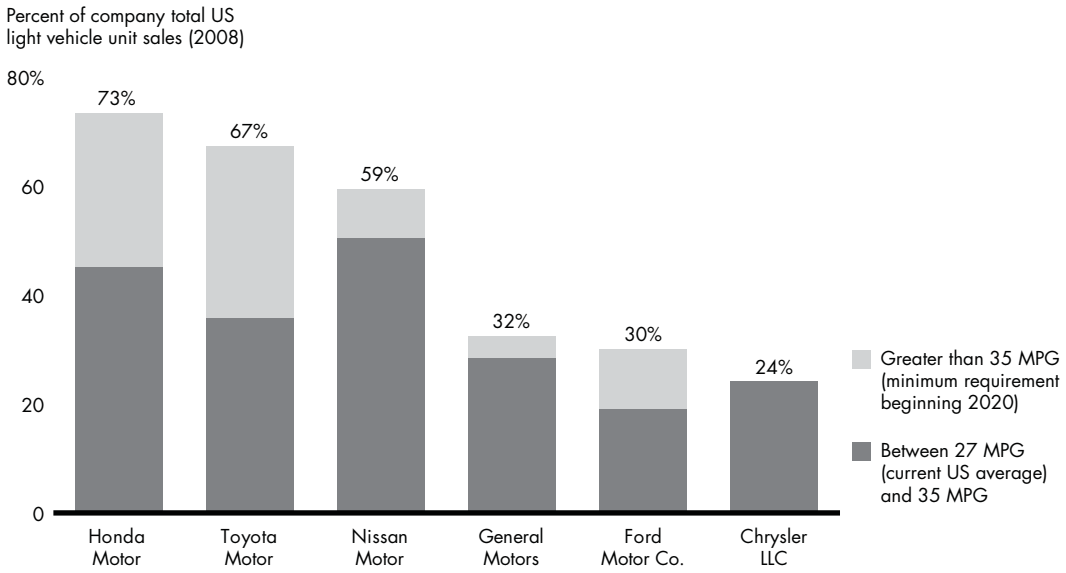
Consider, for example, automakers. Under virtually all conceivable CO_2 regulatory regimes, those automakers that are the best at making and marketing the most efficient cars will be the best off. If, for example, the only regulatory mechanism employed were a price on CO_2 emissions, then that would manifest itself in higher gasoline and diesel prices: A high carbon price of $60 per ton of CO_2 would effectively result in a $0.50-per-gallon gas tax. Those higher prices would distort the market toward more efficient cars. But well before the carbon price reaches $60 per ton, other regulatory mechanisms will favor more efficient manufacturers.

If we consider the current weighted average fuel economy of six major automakers, US automakers are less competitive. The US Corporate Average Fuel Economy standards have not changed significantly since the early 1980s. But in the past 25 years, US automakers followed a very different product development strategy compared with Japanese and European automakers. US automakers were content with a compliance strategy with respect to fuel economy, while foreign automakers focused on fuel economy as a product attribute worth improving for its own sake. It should be noted that both foreign and US automakers faced higher standards in European and Japanese markets, but only the foreign companies produced fleets for sale in the US with efficiencies similar to the efficiencies of their foreign fleets (see Figure 3). As a result of their different product development strategies over the last three decades, foreign automakers are substantially better positioned for almost any form of CO_2 regulation.

In many industries, CEOs need to understand better the ramifications of product portfolio mix on their company's competitive position in a carbon-constrained world. Once again, the challenge of improving a company's product portfolio mix can take years—just the product development and R&D implications are huge. The task is often exacerbated by the need to generate demand for novel products to ensure that they are successful in the marketplace. Once again, clear priorities are required and careful consideration must be given to capital deployment and investment return trade-offs associated with funding the product development pipeline and R&D activities.

Direct and indirect exposure: Oil producers, as a group, are vulnerable to carbon constraining policies. Oil companies face regulatory expo-

Figure 3: Efficiency regulation: Range of impact on product portfolio



Note: MPG ratings for models with multiple submodels averaged subject to the restraint that the standard deviation was less than 3 MPG.
Current MPG ratings not available for 2% of GM, Ford, Chrysler models, 1% of Nissan models.
Source: *Automotive News*, fueleconomy.gov

sure to both *direct* and *indirect* CO_2 emissions. While it might seem that indirect emissions—the quantity of CO_2 released when the fossil fuel they produce is burned by the end customer—are likely to be their most important exposure, that is not the full story.

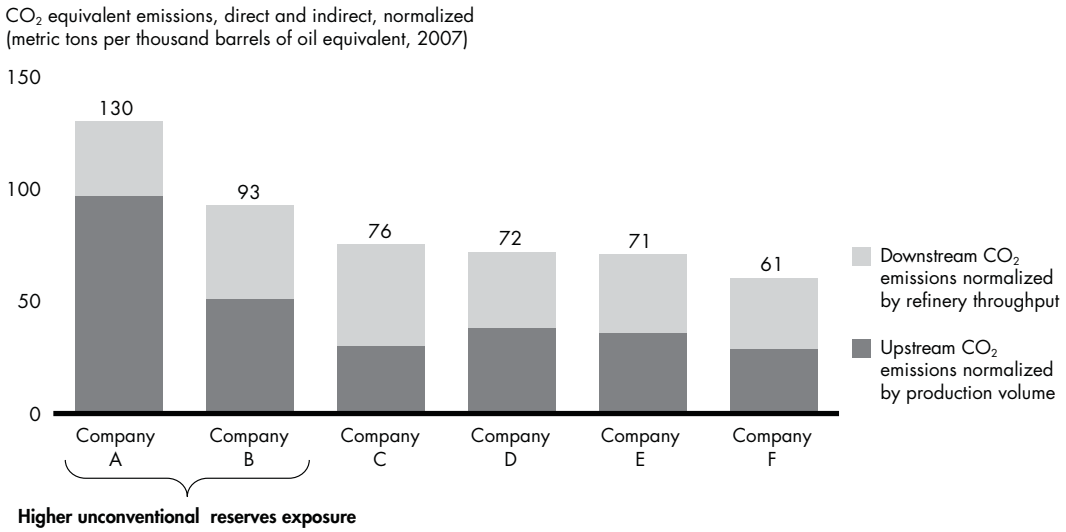
First, consider indirect exposure. Every barrel of oil sold produces just over half a ton of CO_2. For example, a very high $60 per ton CO_2 carbon tax would add about $30 to the price of a barrel of oil. In response to that price hike, demand would decrease and the highest-cost producers would lose business. Now, let us consider direct exposure. Different companies supply crude oil at different production costs. Saudi Arabian crude, for example, is supplied at a marginal production cost of about $2 per barrel, and the cost rises for certain unconventional oil sources to more than $30 per barrel. Clearly, the quality of an oil firm's assets—that is, its reserves—determines, in part, how its competitive positioning will be affected by CO_2 regulations. Indeed, oil firms whose output is dominated by producing at or near the market clearing price prior to CO_2 regulations will find their business severely threatened by such regulations.

In addition to the threat of changing market demand associated with artificially higher oil prices, oil firms directly emit substantial quantities of CO_2 in both their upstream (oil production) and downstream (oil refining) operations. Upstream emissions come from either CO_2 that is co-produced with oil or from fuel that is burned in the oil extraction process, while downstream emissions consist of fuel that is burned at refineries.

When we compared the quantity of CO_2 emitted by six different oil firms as they bring oil to market, we found there were substantial differences between companies. Company A—the most CO_2 intensive of the companies that we studied—emits more than twice the quantity of CO_2 as Company F for every barrel of oil that it brings to market (see Figure 4). We found that the difference is mostly due to upstream operations. Company A and B have substantial holdings in the Alberta oil sands. Those unconventional fields require large quantities of steam to be injected into the oil sands. In situ, the steam changes the physical properties of the high-viscous oil, enabling it to be extracted. Once extracted, the high-viscous oil must be pre-processed prior to refining. All those pre-refining steps require large quantities of fuel to be burned, resulting in relatively high CO_2 emissions per barrel sold.

At a $60 per ton CO_2 price, Company A would face about an $8 per barrel tax while Company F would face about a $3.5/barrel tax. Furthermore, Company A—like other unconventional producers—is one of the higher-cost producers to begin with. Net result: More expensive oil generates more CO_2. Therefore, firms with significant unconventional reserves will be hit twice by CO_2 regulations: Market distortions by a CO_2 price will shift the demand curve away from their products, causing them to lose market share, while their direct CO_2 liabilities will increase their costs relative to competitors with more traditional reserves. Within the oil industry, therefore, it's the firms with the greatest indirect exposure that are also those most vulnerable to direct emission.

Figure 4: Relative carbon intensity of upstream operations: Oil producers are differentially positioned for carbon regulation



Note: Emissions figures based on data released by each company. Upstream includes exploration and production of crude oil and natural gas. Emissions attributed to "Chemical" or "Other" business segments not reflected here. Company F data adjusted to allocate cogeneration emissions to downstream, chemical, other segments. Company A and Company B data, adjusted to allocate indirect emissions to upstream, downstream segments. Company B's indirect CO_2 emissions based on 2006 data as 2007 data not available.
Source: Company websites, Carbon Disclosure Project

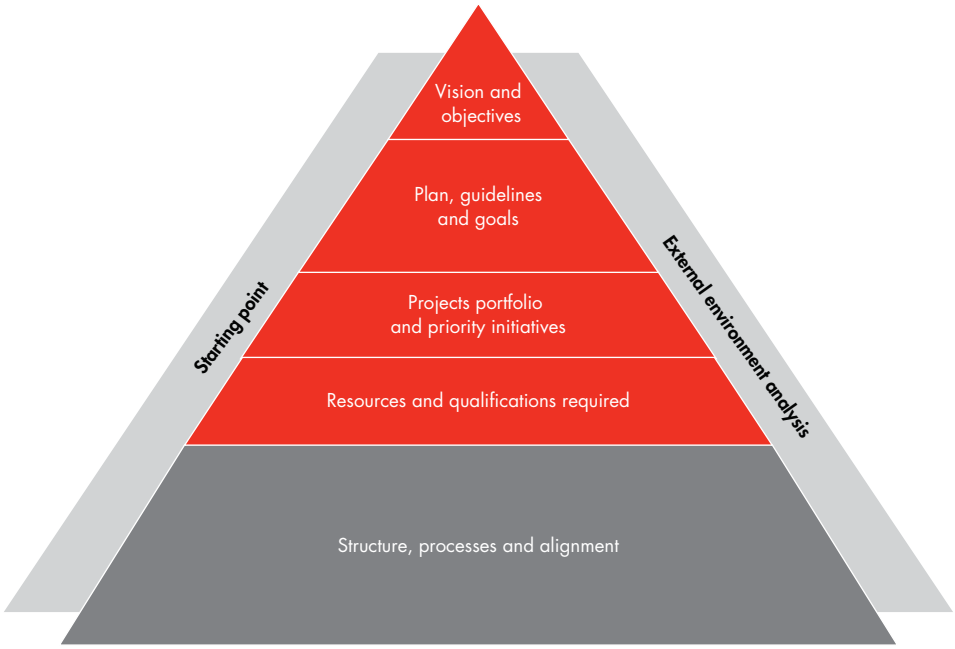
Building competitive strengths

The key to building carbon competitiveness within an industry lies in taking a cold, hard look at the company's assets, production processes and products—and benchmarking them against the carbon footprint of the competition. CEOs who play a strong role in industry level carbon regulation discussions need to be particularly careful: It is not about influencing policy at the macro level or even measuring the potential impact of regulations on the company and competitors. It's about slowly but surely identifying and mitigating the inefficient processes and legacy assets that weigh down a company's ability to produce products competitively with lower carbon emissions—and designing and delivering world-class products in a greener, more sustainable world.

As in all effective change management initiatives, the CEO is in the best position to steer the company toward a more sustainable, secure future. That might sound burdensome to some CEOs who already feel beleaguered by the number of initiatives they are expected to lead. Developing a strategy for energy efficiency requires making hard, visionary decisions that then have to be marketed to the board and shareholders and implemented by employees across the organization. Done right, the business benefits can be enormous, ranging from improved profitability, operational efficiency, better adaptation to market requirements and heightened preparedness for future regulatory scenarios, or simply, a more positive public image of the company.

We find that CEOs who embrace this responsibility start with setting the long-term vision and clearly articulating the objectives of their energy efficiency strategy (see Figure 5). That involves understanding the starting point better—what types of emissions is the company

Figure 5: Carbon competitiveness: A practical approach to build energy efficiency



most vulnerable to: direct, indirect or both? And how does the company's vulnerability compare with the competitions', based on their respective unique legacy assets? Answers to such questions help in developing a set of milestones that the company needs to meet to reach the long-term goal of relative carbon competitiveness. In several instances we find that CEOs actually prefer to do that at the business-unit level by setting guidelines that are most appropriate for that particular line of business.

Often it's not just one strategic approach but a whole slew of initiatives that are required to get a company started on its path of sustainability. Nearly always though, the process starts with taking stock of the "inventory"—all the possible ways in which the company is currently consuming energy—and then identifying the alternatives that could help reduce emissions. As it is neither practical nor desirable to open all battlefronts at the same time, most companies prefer to prioritize options based on the potential reduction benefits and the cost it would involve to get there. It is remarkable how even a quick review based on these criteria swiftly shows where a company can easily implement changes that will help it reduce the cost of carbon emissions most. Frequently, these are hiding in plain sight; in other instances, more evaluation is needed.

Unfortunately, even the busiest CEO will find that ignoring the issue is no longer an option. In most companies, the top management already realizes that they have to start planning today for the carbon-regulated world of tomorrow and the only question is timing: Will they take the lead in their industry and gain competitive ground, or will they choose to follow the competition's lead. The challenge to reposition a company with less competitive legacy assets and products is daunting and can take years to overcome. But CEOs have to remember that it is through no fault of their own or their predecessors that a company finds itself in a position of relative weakness. No matter what the historical journey of the company or the legacy baggage it carries, it is the responsibility of the incumbent CEO to plan for the road ahead—and leave behind a smaller carbon footprint.

A CEO's call to action: Why tracking industry regulation is not enough

Government regulations and proposals aimed at decreasing the emissions of CO_2 currently exist in many different forms. Although the various laws assume different structures, their foundational purpose—to decrease the rate at which fossil fuels are burned—is the same. Essentially, there are three categories of policies used by governments to decrease CO_2 emissions:

1) **Economic sanctions:** Here, CO_2 emissions are essentially taxed, either directly with a *carbon tax* or indirectly with a *cap-and-trade* scheme. In the latter case, governments establish caps on CO_2 emissions for individual sources and require sources that exceed their cap to purchase tradable permits from sources that emit less CO_2 than their own limit.

2) **Incentives:** Using direct government incentives such as *production tax credits, investment tax credits* and *loan guarantees* for alternative technologies with relatively low CO_2 emissions.

3) **Standards:** Requiring minimum energy efficiency and CO_2 efficiency for a wide range of products and processes (vehicle fuel efficiency standards, for example). Standards also include requiring a certain mix of fuels and energy, such as renewable portfolio standards and renewable fuel standards.

Such policy mechanisms distort markets away from products and processes with relatively high CO_2 emissions and toward products and processes with relatively low CO_2 emissions. The first two mechanisms distort the market by making products and processes with relatively low CO_2 emissions more competitive. The result of pricing CO_2 emissions through a *carbon tax* or through a *cap-and-trade* scheme, for example, will be that firms with higher CO_2 emissions per unit of value relative to their competitors will face larger financial penalties and will thus be made less competitive. Likewise, *incentives* are effectively government subsidies of less-carbon-intensive products and processes.

The last mechanism, *standards*, is different in form from the first two, but it implies that firms whose asset mix and product mix is relatively CO_2 intensive may be forced partially to divest or retrofit their assets and their product lines. Such forced redeployment of capital is likely to hurt their competitiveness if companies take corrective measures reactively. Since all the policy mechanisms, however, are intended to distort the competitive landscape toward firms with relatively low CO_2 emissions per unit of value generated, the impact of any permutation of these mechanisms will be to put companies that are relatively carbon intense at a competitive disadvantage. There really is no way to avoid the hot issue: For their company's long-term well-being, CEOs have to worry about their relative carbon competitiveness now.

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