

# 'Greening' Transportation in the Supply Chain

Even corporations with clear environmental aims fail to go the distance when it comes to their supply chains. But lessons from a small group of Fortune 500 companies can give them the direction they need.

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NOT LONG AGO, it would have been considered unnatural for corporations to set their priorities and goals with an eye toward improving their environmental performance. But a steady flow of high-profile corporate initiatives and studies of customer behavior have revealed a change in the business climate. Companies that integrate sustainability practices throughout their supply chains are experiencing a clear benefit. Increasingly, key stakeholders — from investors to customers to prospective employees — are monitoring sustainability efforts for themselves and making their decisions accordingly. (See "About the Research," p. 49.)

But more than just the threat of negative publicity is pushing corporations into the green zone. With domestic policy makers debating the merits of cap-and-trade legislation and world leaders struggling to agree on a climate change treaty, it's only a matter of time before environmentally unaware companies will

**THE LEADING QUESTION**  
 How are companies addressing the environmental impact of transportation in their supply chains?

## FINDINGS

- ▶ Only 22 Fortune 500 companies have begun blunting their supply chain's impact on the environment.
- ▶ Mostly, they pursue discreet projects with measurable outcomes.
- ▶ A more holistic approach could yield greater rewards — but not without requiring risky upfront investment.



FedEx's 'greener' supply chain strategy has included building one of the largest commercial hybrid fleets in North America. Here, California Governor Arnold Schwarzenegger participates in the company's strategy announcement in 2004.

face steep fines for their failure to keep pace. At the same time, the slow-growing U.S. economy is forcing companies to focus on improving their efficiency to offset tepid demand and counterbalance the price volatility of commodities such as water and energy.

For corporations, the commitment to reducing their carbon footprint is the first of many daunting steps. Executives must organize both interior and exterior expeditions. By turning their organizations inside out, they can pinpoint how and where energy is consumed. They need to monitor innovations from the outside world in fields like genetic engineering and improvements in battery performance for electric vehicles. With what they learn, they need to take a fresh look at every aspect of their business: packaging, cleaning, each link in each supply chain. If that sounds utterly overwhelming, it is.

Or, rather, it must be. That would help to explain why many eco-conscious companies overlook one of their supply chains' costliest and most environmentally damaging components: transportation.

Until very recently, freight transportation was a negligible consideration in company strategy with regard to environmental responsibility. However, current business practices such as international sourcing and quick turnaround times challenge this by extending transportation distances and minimizing lead times in the supply chain. Standard modes of transportation consume fossil fuels, generate noise and emit toxic compounds. In 2007, transportation accounted for 28.4% of U.S. energy consumption and 33.6% of carbon dioxide emissions.<sup>1</sup>

### The Road Taken: The Collision of Logistics and the Environment

International sourcing has grown steadily over the past few decades, and the economic theory of trade suggests that increased specialization by country and region will prevail — meaning that trade will continue to grow. Corporations buy from foreign suppliers for many reasons, including to establish a presence in foreign markets, to increase their ranks of suppliers and to react to competitors by lowering prices. Sourcing materials from other countries, however, naturally increases transportation distance and the associated environmental consequences.

The need to boost supply chain responsiveness has had a major impact. Increasingly demanding

customers, outsourcing, globalization and advances in technology have forced companies to develop agile supply chain processes.<sup>2</sup> To minimize financial risk in the face of uncertain demand, companies keep less inventory, which requires them to make smaller but more frequent shipments — possibly using faster transportation modes to support reduced lead times. While these activities may minimize manufacturing waste, these "lean" practices rarely consider the greenhouse gas impact associated with more frequent transportation, which also can emit higher levels of greenhouse gases. Offshore manufacturing compounds the problem because it extends the supply chain, causing companies to work even harder to reduce these longer lead times.

Supply chain management has largely overlooked the greenhouse gas impact of transportation decisions. This lack of attention is surprising, especially given growing global dependence on freight transportation; in the next 20 years, the amount of cargo shipped is expected to triple.<sup>3</sup> To support supply chain agility, many companies are accelerating their spending on faster kinds of transportation, that is, motor (trucks and other vehicles) and air, the same modes that have the most unfavorable environmental impact per ton mile. Motor transportation is four times less fuel-efficient per ton mile than rail,<sup>4</sup> and emissions from airfreight are 600 times higher than those from rail or ocean shipping and nearly 90 times higher than those from motor transportation in the United States.<sup>5</sup>

Given the high greenhouse gas impact of such transportation, it is vital to alert top executives to the importance of including transportation impacts in any environmental analysis of their supply chains. We explored the strategies and practices of more than three dozen Fortune 500 companies to determine the extent to which they acted beyond merely acknowledging the emission impact of their transportation. It's a long way between heightened awareness and effective action.

### Step by Step: The Stages of Reducing the Supply Chain Footprint

We examined 44 Fortune 500 companies that addressed 11 transportation practices, ranging from creating specific goals to implementing explicit changes to transportation in the supply chain. (See



Freight carrier CSX Corp. has invested more than \$1 billion since 2000 in more efficient clean air locomotives.

"How Fortune 500 Companies Address Environmental Impacts of Transportation," p. 50 and "Key to Transportation Practices," p. 51.) The 11 practices were grouped into three levels based on the apparent amount of environmental sustainability demonstrated in the supply chain. The first, the foundation level, includes initial steps that acknowledge the company's transportation emissions impact. These themes establish a foundation or basis for the company to begin to address transportation emissions, rather than being specific activities to reduce the impact. All but one of the 44 companies provided evidence of this level of engagement. A subset of 28 companies went beyond this to internal company practices, taking initial actions to educate personnel and build a culture that encourages the reduction of greenhouse gas emissions from transportation. Finally, 22 companies reported implementing supply chain practices, tactics that begin to reduce the greenhouse gas emissions resulting from freight transportation in their supply chain.

**Establishing a Foundation** Activities at the foundation level include developing goals for limiting transportation's impact, using metrics to measure that impact, building partnerships with other organizations to help the focal companies accomplish their goals and acknowledging that additional benefits are possible.

Twenty-five corporations have explicit goals for decreasing the impact of transportation. Of these, 23 describe general plans to reduce energy or fuel usage. For example, E.I. du Pont de Nemours and Co. intends to "introduce fleet vehicles with leading technology for fuel efficiency and fossil fuel alternatives," according to the sustainability page on its Web site. Some objectives are more specific: In its "2008 Global Citizenship Report," FedEx Corp., which has one of the largest commercial hybrid fleets in North America, set a goal to improve its overall fuel efficiency 20% by 2020. Five companies share the goal of optimizing their supply chain network. The Home Depot Inc., for example, plans to begin using an environmental clause in its transportation-related contracts.

Any entity serious about change must include measurement as a fundamental starting point. Nine companies report measures of the current emissions impact of their transportation of products or

## ABOUT THE RESEARCH

This study, conducted in 2008, explored the strategies and practices of more than three dozen Fortune 500 companies to determine the extent to which they acted to improve supply chain and transportation sustainability. To obtain a sample of companies with environmental business strategies, we first researched three environmental supply chain initiatives: EPA's Climate Leaders, EPA's SmartWay Transportation Partnership and the Global Environmental Management Initiative. These consider greenhouse gas emissions across industries and provide a way to target companies that have a particular interest in supply chain sustainability. The companies participating in the three initiatives were cross-referenced with Fortune 500 and Roberts Environmental Center listed companies, yielding a total of 294 businesses demonstrating environmental strategies (58.8% of the Fortune 500), with 76 (15.2%) participating in at least two of the three initiatives. Eight companies that participated only in SmartWay were added to the list of 76.

We examined public information provided on the Web sites of the 84 total sample companies. The annual report, corporate responsibility report if it existed and the Web site itself were reviewed to categorize the businesses according to how they addressed environmental concerns. In order to specifically determine which companies addressed transportation emissions, we independently categorized the information as to whether it was relevant to transportation. This yielded a total sample of 44 companies that addressed transportation emissions in some fashion.

Each entry discussing environmental transportation from these 44 companies was copied verbatim from the reports and/or Web site into text documents. Although self-reported, these data are reports of the companies' strategies and tactics used to address transportation emission impacts and thus are appropriate for our study. Content analysis was used to extract themes related to environmental transportation practices from the data, facilitated by a software package. We developed some content themes in advance based on the literature and knowledge of the industries; others emerged from reviews of the data for a total of 11 themes — mode, fuel, technology, volume, commute, training, fleet, metrics, goals, partner and benefits. Each document was analyzed independently by two researchers, yielding a coding reliability of 71.3%, acceptable for this type of analysis. A third researcher reviewed the codes and resolved any discrepancies. The 11 themes were then analyzed further to determine relationships among them so they could be grouped based on the extent to which they addressed transportation practices.

employees. Seventeen companies offer metrics that report improvements over the past year. For example, Dell Inc. measures its greenhouse gas emission reductions, and Office Depot Inc. and FedEx track fuel usage and its associated greenhouse gas impact.

Twenty-one companies mention partnerships — with specific government organizations (15), nongovernment organizations (5) and/or supplier and customer companies (7) — in order to help them tackle their environmental impact. The most frequently mentioned partnership (11 companies) was with the U.S. Environmental Protection Agency's SmartWay program, which is targeted at helping shippers and carriers reduce emissions.

Although one argument against implementing sustainable practices is the cost of doing so, some

**HOW FORTUNE 500 COMPANIES ADDRESS ENVIRONMENTAL IMPACTS OF TRANSPORTATION**

Among Fortune 500 companies, 44 have publicly addressed the environmental effects of transportation in their supply chains — some just acknowledging them ("Foundation"), some altering practice ("Internal"), and some achieving reductions ("Impact"). See "Key," p. 51.

COMPANY (FORTUNE 500 RANKING, 2008)	INDUSTRY	FOUNDATION NODES	INTERNAL COMPANY PRACTICE NODES	SUPPLY CHAIN IMPACT NODES
Raytheon (97)	Aerospace		Commute; fleet	
DuPont (73)	Chemical	Goals		Fuel
Air Products and Chemicals (282)	Chemical	Metrics		Volume
Owens Corning (341)	Chemical	Partner	Fleet	Fuel; mode; technology; volume
Ecolab (459)	Chemical	Goals		Fuel
HP (11)	Computer	Benefits; goals; metrics; partner	Commute; fleet; training	Mode; volume
Dell (25)	Computer	Benefits; goals; metrics	Commute	Mode; technology; volume
Xerox (142)	Computer	Benefits; metrics	Fleet	
Sun Microsystems (211)	Computer	Benefits	Commute; training	
General Electric (7)	Diversified	Goals	Fleet	
AMD (367)	Electronics	Partner	Commute; training	
Rockwell Automation (427)	Electronics	Goals; partner		
Whirlpool (152)	Electronics	Goals; partner		
Tyson Foods (80)	Food and beverage	Goals; partner		Fuel; technology
Coca-Cola (89)	Food and beverage	Goals	Fleet	Fuel; technology
Smithfield Foods (205)	Food and beverage	Metrics		
UPS (44)	Freight/shipping	Goals; metrics; partner	Fleet; training	Fuel; technology; volume
FedEx (70)	Freight/shipping	Goals; metrics; partner	Fleet	Fuel; mode; technology; volume
CSX (266)	Freight/shipping	Goals; metrics; partner	Fleet	Fuel; technology
Wal-Mart (2)	General merchandiser	Benefits; goals; partner		Fuel; technology
Walgreen (45)	General merchandiser	Metrics	Fleet	Fuel
Nike (163)	Household/personal	Benefits; goals; partner		
Limited Brands (246)	Household/personal	Metrics; partner		Mode; volume
Estée Lauder (340)	Household/personal	Metrics; partner	Commute	Mode; volume
Cisco Systems (83)	Information technology	Goals; partner	Commute; training	
Oracle (196)	Information technology	Goals	Commute	
Baxter International (240)	Medical products	Goals; partner		Mode; volume
Pfizer (31)	Pharmaceuticals	Goals; metrics; partner	Fleet	
Johnson & Johnson (32)	Pharmaceuticals	Goals; metrics; partner	Fleet	Fuel; mode; volume
Abbott Laboratories (93)	Pharmaceuticals	Metrics; partner	Commute; fleet; training	
Merck (95)	Pharmaceuticals	Metrics		
Bristol-Myers Squibb (110)	Pharmaceuticals	Benefits; goals; metrics; partner	Commute	
Wyeth (119)	Pharmaceuticals		Commute; fleet	
Schering-Plough (250)	Pharmaceuticals	Metrics	Commute; fleet	
Home Depot (14)	Retail	Goals; partner		
Lowe's (42)	Retail	Metrics; partner		Mode; volume
Best Buy (76)	Retail	Goals		
Staples (137)	Retail	Metrics	Fleet	
TJX (138)	Retail			Mode; volume
Office Depot (154)	Retail	Benefits; goals; metrics	Fleet	Mode; technology; volume
Agilent Technologies (319)	Scientific/photo	Metrics	Commute; fleet; training	
Qualcomm (381)	Telecommunication		Commute; fleet	
American Electric Power (185)	Utilities	Goals	Fleet	Fuel
FPL Group (195)	Utilities	Goals; metrics	Fleet	Fuel

proponents of sustainability argue that it is not only free but can actually improve company performance. Eight companies specifically acknowledge that reducing energy and emissions saves money for the company and its employees. Bristol-Myers Squibb Co. recognizes that it experiences increased productivity due to its commuting practices. Dell acknowledges that its practices reduce product delivery times, thus recognizing the positive impact on customers.

**Changing Internal Company Practices** Twenty-eight companies have moved to the second level, making changes to internal company practices aimed at reducing transportation emissions. These include

### KEY TO TRANSPORTATION PRACTICES

Analysis of the transportation-related sustainability practices of Fortune 500 companies (see p. 50) revealed 11 distinct practices or tactical areas.

NODE	MEANING
Commute	Efforts targeted at personal travel to/from work
Mode	Modal decisions to decrease impact for shipments of goods (this includes switching modes or reducing idle or wait time)
Fuel	Use of alternative fuels for shipments of goods
Technology	Use of technology to decrease impact for shipments of goods
Volume	Decrease in volume of goods shipped or number of shipments (includes anything done regarding the efficiency of shipments)
Metric	Measurement/tracking of transportation (goods or personnel) impact on environment
Training	Actions taken to inform employees of impact of transportation or ways to decrease impact
Fleet	Mention of actions taken regarding fleet of vehicles used, whether for goods or personnel transport (e.g., sales personnel)
Partner	Any other organizations involved with helping the company reduce transportation impact
Goals	General statements about improving environmental impact from transportation
Benefits	Additional benefits achieved when implementing something to decrease environmental impact

managing the company's fleet of vehicles to reduce its environmental impact and creating training programs to teach employees how to make positive changes. Establishing employee commute programs that target personal travel to and from the workplace is included as well. While practices focused on employee transit are outside the domain of freight transportation, they do contribute to educating employees on greenhouse gas emissions and reinforce a corporate culture of environmental awareness.

Twenty-one companies report the use of fleet management to improve energy efficiency and reduce emissions from transportation. Eighteen companies provide specific methods of reducing carbon emissions, most opting for more-energy-efficient vehicles. Johnson & Johnson had the largest corporate fleet of hybrid vehicles in the United States as of March 2008, with 978 hybrids in operation and 508 more ordered. Office Depot replaced oversized diesel delivery trucks with lighter Dodge Sprinter cargo vans that have twice the fuel efficiency of their predecessors. Freight carrier CSX Corp. has invested more than \$1 billion since 2000 to upgrade its fleet with more efficient clean air locomotives; it plans to reduce fuel consumption by another 10 million gallons by upgrading 1,200 additional locomotives.

Fourteen companies mention employee commute programs as part of their efforts to reduce their transport-related carbon footprint. Thirteen companies encourage the use of alternative transportation options, including shuttle buses, carpools, bicycles and public transportation. Five companies have installed and use videoconferencing and other communication technologies, thus reducing transportation emissions from employee travel.

**Impacting Supply Chain Practices** Only a very small percentage of Fortune 500 companies have tried to significantly reduce greenhouse gas emissions from freight transportation in the supply chain through technological or operational tactics. These 22 companies are aggressively decreasing fuel use, switching loads to more environmentally friendly modes (i.e., forms of transportation such as rail), adopting technology to increase shipment efficiency and effectiveness and reducing shipment volume.

Among the 13 companies implementing tactics to conserve fuel and/or substitute alternative fuels, six

have shifted to less polluting fuels, including biodiesel. In its 2006 sustainability report, utility giant FPL Group Inc. noted the recognition it received from the Council for Sustainable Florida for its use of 2 million gallons of soybean diesel in 2005. Seven companies are either using auxiliary power units or changing delivery practices to reduce truck idle time, a large contributor to fuel waste. FedEx, Johnson & Johnson and Wal-Mart report using wider tires on their trucks, and Tyson Foods uses aluminum wheels on its tractors, theoretically reducing road friction and thus increasing fuel efficiency and reducing emissions. Besides implementing tactics to reduce fuel emissions, FedEx is advocating that the U.S. Senate Energy and Natural Resources Committee establish vehicle efficiency standards that would ultimately impact all road shipments.

Eleven companies are decreasing the impact of their mode of transportation by switching to a more environmentally friendly mode or improving the existing method's capacity utilization. HP, Baxter, Lowe's and Johnson & Johnson are all shifting portions of road transport to rail, and HP, Dell, Limited Brands and Estee Lauder are converting air shipments to ground or ocean transport. Eight companies are reconfiguring pallets and packaging to increase trailers' volume efficiency. Baxter International Inc. collaborates with supply chain partners to decrease the number of loads and eliminate empty miles.

Companies are deploying new technologies to increase mode and shipment efficiency. United Parcel Service Inc. has multiple IT programs that optimize ground and air routes for its fleet as well as surface taxiing for its aircraft. Office Depot uses Roadnet Transportation software to arrange smarter delivery routes, eliminating 30% to 50% of local shipments by enabling more first-time deliveries. Tyson Foods Inc. uses software to remotely monitor engine diagnostic information to help reduce truck engine idle time. Seven other companies utilize various devices that affect modal efficiency. For example, CSX has installed automatic shutdown systems on its locomotives to reduce fuel usage.

Many of these mode changes and technologies are targeted at reducing total shipment volume or weight, the ultimate means of reducing emissions from transportation. Reports from 10 companies describe reducing the number of shipments through better vehicle utilization or efficient routing.

In 2006, Owens Corning received a SmartWay Excellence Award from the EPA, as have Lowe's and Limited Brands. Four companies, including Dell and Air Products and Chemicals Inc., have gone beyond routing and describe decisions made with respect to positioning local offices and distribution centers to decrease the physical distance between themselves and supply chain partners.

Given the state of the economy, it's hardly surprising that all kinds of customers — from consumers to industrial buyers — scrutinize prices. When procuring or manufacturing a product overseas is substantially cheaper than doing so in the United States, it is difficult to justify buying locally in order to reduce transportation greenhouse gases. Since many of the goods produced in developing countries are consumed in more industrialized nations, shipping goods long distances from point of manufacture to consumption creates a much greater transportation burden than do local manufacturing and consumption.<sup>6</sup> Companies shouldn't have to make a trade-off between being profitable and reducing transportation emissions.

It's possible that the companies studied haven't gotten as far along — or as much out of — their transportation-related environmental projects as their public pronouncements indicate. The difference between a planned project and one that is actually implemented is often hard to detect from the outside. And corporations frequently hesitate to share detailed results with the outside world, which includes their competitors. For example, on the sustainability page of its Web site, Owens Corning reports implementing several fuel efficiency practices, such as considering intermodal transportation and increasing truck utilization, but does not specify the fuel consumption or emission results of these practices. And although FedEx's Web site describes the usage of in-gate aircraft auxiliary power units that reportedly reduced fuel consumption by an estimated 5.5 million gallons, this savings is not put in the context of FedEx's total annual consumption.

### **Fuel for Thought: Best Practices on the Route to Change**

For any company to reach the highest level of accomplishment in the emissions-reducing realm, it would have to work closely with its supply chain

partners throughout its global logistics network. None of the companies in our study had achieved this. But from their experiences so far, here are some best practices that are emerging as companies make strategic progress toward achieving sustainable supply chain transportation.

As with any major change initiative, it is best to begin with the "low-hanging fruit," or those projects that are relatively easy to implement, have a high probability of measurable success and are readily visible to key stakeholders. It would be ideal if these initiatives also saved money or were at least cost neutral, such as reducing the volume of transportation moves through more efficient loading.

During the initial stage of developing environmentally sustainable transportation practices, what we call "establishing a foundation," a company identifies what it wants to accomplish, how the results will be measured and reported, what benefits the company may receive and with whom to engage in its sustainable transportation initiatives. This may include memberships in environmentally oriented organizations, partnerships with suppliers and

transportation providers and even alliances within the company. For example, if metrics will be created to measure the impact of emission-reducing efforts, the people who will have input into implementing the efforts should be involved in advance. This stage is important for fact finding and bridge building. UPS established a fuel conservation committee to examine the way it uses fuel for its ground fleet in order to establish reduction goals. Such success stories play an important role in institutionalizing sustainable transportation practices.

Once research has been conducted and some baseline goals and measurements have been established, implementation of the next level, improved internal company practices, can begin. The organization may focus on approaches that simultaneously save money or improve service while training employees and building a culture receptive to reducing transportation-related greenhouse gases. Examples of such projects include Hewlett-Packard Co.'s and Bristol-Myers Squibb Co.'s use of videoconferencing. It is important for employees to understand the customer service effects and for executives to get

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buy-in prior to implementing any changes, so that all of the outcomes and associated visibility of the projects are as positive as possible. It is also critical that management measure the costs and the results, so that the project's impact is clear and uncontested. For example, Abbott Laboratories and Schering-Plough Corp. both report specific fuel economy improvements — which can be translated into dollars saved — from their fleet initiatives.

Impacting supply chain practices with respect to transportation emissions involves decreasing fuel use through adjusting the volume, distance and mode of shipping and using technology to increase shipments' efficiency and effectiveness. Meaningful measurements are essential here to continue the visibility and growth of environmental transportation tactics. Fourteen companies reported measures of efficiency such as saving money, reducing weight or reducing inventory levels. Routing changes enabled Office Depot to increase the number of packages on a truck from about 130 to about 190. Twelve companies provided measures of effectiveness such as reducing greenhouse gases and other forms of pollution and improving service. By working with customers to schedule preferred delivery times, Dell increased first-time deliveries to customers by 80%, reducing their overall transportation needs.

These first three levels of environmentally sustainable transportation are really a progression of programs that do not require uncomfortable or difficult choices and yield solid environmental and financial results. Once a certain level of success has been achieved, an organization may be ready to move to the ultimate goal of strategic sustainable supply chain transportation. This entails working more closely with supply chain partners on an overall strategy for actively minimizing the supply chain's transportation greenhouse gas emissions. At this point, the trade-offs — societal impact versus business performance — become difficult. Executives must learn to manage mountains of data to get a decent view of the consequences that will be set off by any changes they make.

### **Emission Accomplished: Making the Environment a Sustainable Priority**

Companies that are serious about developing strategic sustainable supply chain transportation need

to elevate environmental considerations when selecting transportation modes and particular carriers. Environmental considerations also must be factored into supplier selection and location of distribution and manufacturing sites. While environmental transportation may not be a direct driver of these decisions, it should be an explicit consideration. To facilitate the consideration of transportation and other environmental impacts in the supply chain, corporate executives should consider the following actions:

- Structuring their supply chain with suppliers and customers that have similar cultures with respect to sustainable practices and are proactively focused on initiatives that minimize the impact of their transportation greenhouse gas emissions (such as partnering with SmartWay carriers for transport of goods throughout the supply chain);
- Utilizing transportation technology that reduces fuel and therefore emissions (for example, when purchasing new trucking equipment, purchasing only equipment that improves aerodynamics, such as low-resistance tires);
- Optimizing their supply chain's logistical network such that transportation distances are minimized (sourcing locally when feasible, moving operations closer to suppliers or customers and eliminating unnecessary moves such as those between distribution centers);
- Developing detailed metrics that monitor actual as well as relative results from all implemented initiatives to determine which strategies have the biggest emission and cost impacts on the supply chain (measuring emission reductions and tracking the associated cost savings; for example, X tons of carbon dioxide in the past month, which amounts to X% of total carbon dioxide emissions, saving \$X in fuel costs or X% of total fuel costs); and
- Utilizing knowledgeable personnel with skills in logistics and environmental sustainability to develop and implement company and supply chain transportation strategies.

This final level is an area that few companies have reached, but one in which the greatest potential improvements can be made with regard to freight transportation emissions. However, it is an area with potential for savings but also potential for initial



In another example of fleet management to improve sustainability, Office Depot replaced oversized diesel delivery trucks with lighter Dodge Sprinter cargo vans that have twice the fuel efficiency of the trucks.

higher cost. For example, companies such as HP, Dell and Estée Lauder probably reduced their overall supply chain costs in converting air shipments to ground or ocean transport. On the other hand, FedEx's extensive introduction of alternative fuel technology may not have an immediate positive financial payback. But the company is willing to use the savings from some of its other environmental projects to fund further improvement in the hopes of eventually seeing a positive return on this technology. There is a limit to the improvements that companies can make in the supply chain by focusing solely on cutting waste and reconfiguring products and purchasing policies. Investing in environmentally friendly transportation technologies is the only way to encourage implementation of strategic initiatives that will ultimately lead to improvements in and reduction of the price of such technologies. The money that is saved through early efficiency improvements could be used in this way.

Few companies do this now, but that may change — although more out of necessity than environmental enlightenment. Since the end of 2006, diesel prices have risen 63.2%, peaking in summer 2008, decreasing through March 2009 and now slowly climbing again. The price of a barrel of oil during this period has been as high as \$136.32 and as low as \$31.84.<sup>7</sup> Regional shortages have occurred due to natural disasters such as Hurricane Ike and turmoil within the U.S. economy. This volatility is a lens into the future of oil and gas prices and supply. One way for companies to take some control over this fluctuation of pricing and availability is to lessen their dependence on these energy sources, which may also help the environment and reduce greenhouse gases from transportation.

Will corporations do it? They could, in fact, be on their way already. Since this study began, the economy has undergone seismic changes. Some companies may well have begun implementing transportation changes as part of cost-cutting plans.

In addition, companies do not always immediately update the information in their public documents. A recent check of the EPA Smart Way partner list shows 40 of the Fortune 500 companies have become partners since this study began in 2008. However, results from a recent McKinsey & Co. survey of 296 top executives regarding their top two supply chain priorities

show that reducing costs is most important, with 57% including it among their top priorities. Only 4% indicated greenhouse gases emissions reduction among their top two priorities.<sup>8</sup> While the increased attention companies have given transportation practices during 2008 and 2009 is promising, the current economic downturn and the ongoing emphasis on supply chain cost-cutting may divert companies' funding and attention from nonmandatory spending, such as greenhouse-gas-reducing initiatives. Time will tell if they will progress to strategic sustainable supply chain transportation, although it seems from many accounts that time is running out.

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