

2008



# Innovations Review

Making green the new business as usual

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ENVIRONMENTAL DEFENSE FUND

finding the ways that work

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## Contributors

We thank the Global Environmental Management Initiative (GEMI) and NAEM, the Premier Association for EHS Management, for reaching out to their memberships for nominations for this report.



The next generation of corporate greening has arrived. Forward-looking companies are producing tangible business benefits from environmental efficiency. In this inaugural review, Environmental Defense Fund highlights some of the latest, most compelling examples of the new business as usual.

This report and additional resources are available online:  
[edf.org/InnovationsReview](http://edf.org/InnovationsReview)

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# A new frontier has emerged at the intersection of business and the environment.

Environmental sustainability is no longer the purview of boutique eco-brands. And it is no longer just about compliance with regulations or securing positive press coverage. It's about driving cost savings through efficiencies, creating new markets and securing competitive advantage. Smart companies realize that what is good for the environment is also good for business.

But after taking care of the basics—like switching to energy-saving lighting, buying recycled office supplies and printing double-sided—what is the next step? With this new annual review, Environmental Defense Fund aims to showcase some of the most promising new trends and best practices. Our goal is to provide a variety of actionable ideas and some inspiration for more dramatic change.

The new processes, products and technologies highlighted in this report were selected based on four key criteria: good for business, good for the environment, ready to be implemented and innovative. We did not include ideas that are still in the R&D stage or those that have already been widely implemented or documented. In some cases, we selected innovations that have already been fully tested and put into commercial use; in other cases, we chose to highlight promising early-stage ideas.

The categories included in this first report are areas in which Environmental Defense Fund has significant expertise (such as packaging, energy and transportation) or where there are substantial opportunities for innovation (such as IT and insurance). We anticipate covering different categories in future editions.

Within each category, we attempted to provide a range of ideas: from incremental changes to more radical, business-model innovations; and from those that offer quick implementation and a short payback period to longer-term, more involved “game-changers.” Additional resources and links are available on our website.



Ideas for this report were collected through interviews with more than 40 experts, a review of leading business and trade publications and nominations from companies. Based on information collected from the companies involved and third party sources, each idea was assessed by technical and subject area experts and reviewed by an advisory panel. (Refer to the Methodology section, page 31, for complete details on our data collection, criteria and screening process.)

It is important to note what this report is not: It is not a comprehensive inventory of all worthy innovations.

There are simply too many good ideas for that to be possible. Nor is it a list of “top green companies.” Many of the companies named in this report are coping with huge environmental footprints. However, the innovations they developed represent a positive step in the right direction. It is also not a review of cutting-edge technologies. In many cases, the innovations are low-tech methods that require more openness to change than advanced technology.

We hope this report contributes to the current dynamic dialogue around business and the environment. Above all, we hope it starts a process of bringing best practices to light so that they can spread more rapidly. We welcome your input on how we can make this report more useful and, most importantly, we want to hear what you are doing. We look forward to highlighting even more innovative practices in next year’s report.

More online: [edf.org/InnovationsReview](http://edf.org/InnovationsReview)

**Additional Resources:** Access more information and tools related to applying these innovations to your company.

**Nominations:** If your company is doing something innovative at the intersection of business and the environment, we want to know about it. Please click on the nominations form. We will review all projects for consideration in next year’s report.

# 2008 Highlights

How can your company take environmental management to the next level? The following examples highlight

	Opportunities	Innovations	Business Benefits
REAL ESTATE	Your roof is under-utilized real estate, but solar panels present a high hurdle rate.	<b>Solar power purchase agreements:</b> Fixed-rate solar power is attainable without upfront capital expenditures or ongoing operating costs (p. 7).	Predictable energy costs.
	Artificial lighting, heating and cooling are used far more than necessary in most buildings.	<b>Passive systems:</b> Low energy lighting, cooling and heating systems, which use sunlight and naturally warm or cool air, are technically and financially feasible (p. 9).	Reduced energy costs. Increased productivity due to more comfortable environment for employees.
OPERATIONS & MANUFACTURING	Rising, unpredictable energy costs threaten profitability.	<b>Institutionalized energy efficiency:</b> Model program illustrates how a global corporation can build energy efficiency into its operations (p. 12).	Reduced energy costs.
	Mitigating environmental problems after the fact is costly and inefficient.	<b>Co-generation plus:</b> A mix of co-generation plus on-site renewable power production can produce reliable, lower-cost energy (p. 11).	Reliable, efficient power.
FLEETS	Rising gas prices make operating sales, service and delivery fleets increasingly expensive.	<b>Telematics:</b> A suite of technologies boost fleet efficiency (p. 14).	Reduced fuel costs, higher productivity and better customer service. A one-year payback period for some fleets.
	Unnecessary packaging generates unnecessary costs.	<b>Dematerialization:</b> Packaging, and the products themselves, can be redesigned to reduce weight and volume (p. 16).	Reduced costs for materials, inventory and shipping. Space on shelf for more products. Opportunity to enhance brand.
PACKAGING		<b>Maximized PCR:</b> Traditional barriers to post-consumer recycled (PCR) content have been broken (p. 17).	Opportunity for reduced costs and to enhance brand.
	Traditional insurance may not sufficiently reward your investment in green building features.	<b>Green building insurance:</b> New insurance products recognize the reduced risk and superior quality of certified green buildings (p. 19).	Potentially lower cost insurance. Assurance of restoring green properties to original condition after a loss.
FINANCE		<b>Large-scale telecommuting programs:</b> Boost telecommuting rates through technology, new processes and changes in corporate culture (p. 20).	Reduced real estate and operating costs. Increased employee productivity and retention.
	Long commutes and gridlock traffic are draining employees' time and morale.	<b>Company-run transit:</b> Getting employees out of traffic via private, wifi-equipped buses reduces stress and time wasted in traffic (p. 21).	Attractive employee benefit. Enhanced employee satisfaction.
HUMAN RESOURCES			

proven methods by which companies are generating business and environmental benefits.

Environmental Benefits	Applicability
Reduced carbon dioxide (CO <sub>2</sub> ) emissions. More renewable power added to grid.	Any company that owns its own building. However this tool relies on state and local incentives as a component of financing.
Reduced CO <sub>2</sub> emissions.	New or retrofitted office, warehouse, retail and manufacturing facilities.
Reduced CO <sub>2</sub> emissions.	Any company with multiple office or manufacturing sites.
Reduced CO <sub>2</sub> emissions. More renewable power added to grid.	Any manufacturing facility.
Reduced solid waste. Fewer toxins and virgin materials used and other benefits, depending on the product.	Any company producing a consumer or business to business product.
Reduced CO <sub>2</sub> emissions.	Available in various configurations by a number of vendors, telematics is applicable to sales, service and delivery fleets.
Fewer virgin resources consumed. Reduced CO <sub>2</sub> emissions and solid waste.	Any company producing a packaged consumer or business to business product.
More incentives for companies to implement green upgrades.	Any company that has invested in, or is considering, green building features.
Reduced energy use and CO <sub>2</sub> emissions.	Any company with an office-based workforce.
	Large companies in metropolitan areas without significant public transportation.

## More innovations

### INDUSTRY-SPECIFIC INNOVATIONS

New products, services and methods are transforming industries.

**Shipping:** New flight pattern reduces fuel consumption (p. 25)

**Retail:** In-store e-waste recycling (p. 18)

**Banking:** Low-carbon investment targets (p. 27); green mortgages (p. 27)

**Food & agriculture:** Generating energy from food waste (p. 26)

### GAME-CHANGERS

These radical innovations represent a complete departure from business as usual.

Net-zero energy office building (p. 8)

Closed-loop apparel production (p. 13)

Solar-powered web hosting (p. 18)

Bagless retailer (p. 26)

Use-based auto insurance (p. 28)



# Company-wide innovations

Environmental innovation is no longer the sole purview of the environmental manager or the corporate responsibility unit. It is happening throughout the organization, in every functional area and at every level. On the following pages we highlight some of the most promising ideas for driving efficiencies—from operations to information technology to human resources.

## Real estate

The building sector is one of the largest contributors to global warming pollution, responsible for nearly 35% of all greenhouse gas emissions in the United States. But change is happening fast: Nearly 3.2 billion square feet of commercial building space is now registered with the U.S. Building Council's LEED (Leadership in Energy and Environmental Design) rating system, including new construction and existing buildings. And companies are finding they can make major emissions reductions, while securing reliable power and lower operating costs—all with an attractive return on investment.

### Overcoming the solar barrier

**How this is innovative:** Although dependent upon state and local incentives, solar power can be a financially viable option.

The sun's energy is clean, cheap and plentiful, but the upfront costs of installing solar panels once presented a daunting barrier to entry for many companies. Fortunately a financing tool, known as Power Purchase Agreements (PPAs), is clearing the path.

Though the details vary from state to state and from company to company, PPAs are based on the same general framework: A third-party solar company funds, installs and maintains a solar energy system for the participating business. The solar company then sells electricity to the business, usually on a 15 to 20-year, fixed-rate contract—often at prices lower than those typically offered for electricity by the local utility.

Macy's is working with solar company SunPower to equip 28 stores through a mix of PPAs and traditional purchases—while upgrading its lighting, heating, cooling and energy-management systems to boost efficiency. The projected benefits include an estimated 40% reduction in demand for utility-provided energy. Carbon dioxide emissions are projected to be reduced by more than 195 million pounds over the lifetime of the systems.

Other major companies—including Wal-Mart, Whole Foods, Kohl's, Staples, Target and Microsoft—have also entered into PPAs with various providers.

The benefits, for both business and the environment, are multiple. In addition to eliminating the financial barrier to entry normally associated with solar power, PPAs are helping to reduce demand for conventional energy sources, cut CO<sub>2</sub> emissions and add renewable power to the grid. At a time of volatile energy prices, PPAs give companies predictable electricity bills and the opportunity to save money on operating costs.



Thanks to a financing tool known as a solar power purchase agreement (PPA), 13 Staples facilities have been equipped with solar panels at no capital cost to the company.

Industry analysts predict PPAs will gain 65–75% market share for commercial solar installation in 2008. However, continued growth is dependent upon the expansion of state and federal solar incentives. PPAs are currently most prevalent in states with favorable government programs, like California and Hawaii.

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## GAME-CHANGER

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### A net-zero energy office building

**How this is innovative:** This visionary office rehab demonstrates that the technology and know-how exist for buildings to produce zero carbon dioxide. Any company contemplating a remodel can learn from this example.

Is it possible to operate an office building on virtually nothing but solar power? Can you run a carbon-neutral business without buying carbon offsets?

Integrated Design Associates (IDeAs), a Silicon Valley based electrical engineering and lighting design services company, is proving that the answers to both these questions is “yes.”



Integrated Design Associates shaded the south-facing windows of its retrofitted Silicon Valley office building with solar panels to capture the sun’s energy while regulating interior temperature.

IDeAs spent one year painstakingly designing its new headquarters to be what the company calls “Z2”—that is, “net-zero energy/net-zero carbon emissions”—believed to be the first commercial building in the United States solely using renewable energy.

Integrated photovoltaic solar panels that serve as the roof membrane power the building. Although the building is connected to the utility grid as a back up for evenings and prolonged cloudy days, it is projected to produce more power than it uses over the course of a year. During the long, hot California summers, when other companies’ power demands spike—and “brown outs” hit—IDeAs will be sending renewable energy into the grid.

The key to success, say its designers, was to squeeze maximum energy efficiency out of every feature. The building is expected to require about 60% less energy than a typical office its size, which allows the relatively limited roof space to house enough solar panels to meet the energy requirements.

The offices are kept warm and cool by a geothermal heat pump, which takes advantage of the earth’s constant year-round temperature. Water flows through pipes laid underneath an open landscape area and passes into the building, where a heat pump collects heat from the water (or uses its cooling effect, depending on the season), then sends it through a radiant floor system of cross-linked tubing.

South-facing windows are shaded by roof overhangs that contain photovoltaics, while the east-facing windows are coated with an electrochromic glaze that darkens whenever the sun hits them directly, just like a good pair of sunglasses.

Key office equipment is linked to the security system and gets powered down whenever the last person exiting the building arms the alarm.

And countering conventional wisdom that ultra-green design can only happen in newly constructed structures, IDeAs did it in a remodeled 1960s-era bank office.



Patagonia equipped its 171,000-square-foot service center in Reno, Nevada, with a night-flush exhaust system that replaces the hot daytime air with cool nighttime air, eliminating the need for air conditioning.

The 7,200-square-foot remodel cost about \$1.8 million, due to the prices of construction and newer technologies, but the company expects to recoup the upfront expenses in about five years.

“With a vision for the ultimate environmentally friendly office and a lot of hard work, the facility’s remodel will prove to many that the quest for net-zero energy is not without merit,” the editors of *Buildings* wrote. “Commercial buildings can reduce greenhouse-gas emissions dramatically.”

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## WHAT EVERY COMPANY SHOULD CONSIDER

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### Passive systems

**How this is innovative:** Why pay for lighting and air conditioning when any office, manufacturing or retail space can access free energy?

Passive systems for regulating lighting and temperature are not innovative (think windows and insulated walls). But after generations of relying on energy-intensive systems, we can now combine the old-fashioned with the high-tech to harness the power of Mother Nature.

Sun-tracking skylights, for example, are cropping up in businesses small and large across the country, from Aveda’s distribution center in Minnesota to Ace

Hardware stores in California. These skylights use solar-powered GPS to follow the sun, maximizing the amount of natural light that can illuminate work places and minimizing electricity costs.

Similarly, solar tubes bring natural light through a dome on the roof and channel it down into interior office space through internal reflective tubing. The light enters the space through a diffuser in the ceiling that resembles a recessed light fixture.

Passive heating and cooling can regulate interior temperatures without air conditioners and boilers. Patagonia’s 171,000-square-foot building in Reno, Nevada, for example, operates without any artificial air conditioning—despite the daytime average temperature of 95° F in summer. A night-flush vent system, which replaces the hot daytime air with cool nighttime air, combined with state-of-the-art roof and wall insulation, makes this achievement possible. Patagonia reports energy savings from 30–35% because of this and other green measures.

Additional opportunities range from window glazing to reflective roof coatings to advanced geothermal systems (see Game-Changer on facing page).

# Operations & manufacturing

Our research in the operations and manufacturing realms turned up tremendous opportunities to improve efficiency and reduce waste—and thereby save money. We were particularly impressed by the new practices being implemented by certain manufacturers of consumer goods. These include reducing factory waste, removing harmful chemicals, increasing the recyclability of products and moving toward the elusive “closed-loop” system. We also sought out the most innovative examples of companies transitioning to low-carbon energy sources and aggressively driving energy efficiency through a combination of technology, creative financing and internal change management.

## Designing products for maximum efficiency

**How this is innovative:** Solving environmental problems—and capitalizing on environmental efficiencies—happens most effectively not after the product is produced, but in the design stage.

Forward-thinking product manufacturers are realizing that the most efficient way to deal with environmental issues associated with their products is in the design stage, not after the product is produced. Nike is an example of this new way of thinking.

Nike made its first foray into more environmentally efficient design in 2005 with the Considered Boot, which minimized manufacturing waste, reduced toxic adhesives, incorporated recycled materials and appealed to a more environmentally conscious consumer. Now, fast-forward three years: Nike has transferred and expanded these principles to its premier athletic shoe, the Air Jordan XX3.

“Our goal was to make the Air Jordan XX3 the best basketball shoe ever, both in performance and sustainability,” says Tinker Hatfield, vice president of innovation design and special projects.

Released in January 2008, the XX3, which retails for \$185 to \$230, is the latest model in the best-selling Air Jordan line introduced during former NBA star Michael Jordan’s rookie season. Nike markets the shoe to the performance athlete, not the eco-conscious consumer.

According to Nike, the new Air Jordan goes much farther than its predecessors in terms of being environmentally sensitive. Hatfield says the parts fit together “like a jigsaw puzzle” to dramatically reduce the need for toxic adhesives, which required the invention of a new 3-D stitching machine to assemble it. The shoe also includes recycled polyester derived from PET bottles and scrap material from the factory floor.



Nike designed the latest Air Jordan with parts that “fit together like a jigsaw puzzle” to reduce toxic adhesives. Materials include polyester from PET bottles and ground up factory waste.

Nike has not released sales figures or cost comparisons for the new Air Jordan, but says that its design process presents efficiencies and cost savings. “Being green isn’t enough,” Hatfield told *BusinessWeek*. “We want to be a change agent, but also profitable and [to] make good business moves.”

### Generating reliable, efficient power

**How this is innovative:** A mix of co-generation plus on-site renewable power production can reduce risk and operating costs for a manufacturing site.

Meeting power needs is no longer just about paying the utility bill. It’s about finding the optimal energy mix and squeezing out maximum efficiency.

Case in point: When rolling blackouts hit California in 2000, officials at Sierra Nevada Brewing Company started to sweat—and not because the office suddenly lacked air-conditioning. Without heat and refrigeration, the thousands of gallons of ale were likely to spoil. “[We] can’t afford to be without power,” said owner/founder Ken Grossman, “because the beer will go bad very quickly.”

As the state’s energy shortage continued, depending on electricity from the grid became increasingly risky for Sierra Nevada. The company needed to find more reliable, affordable alternative sources of power to protect its bottom line. With financial support from the California Public Utilities Commission, the brewery implemented an integrated power-generation system that dramatically cut costs and increased energy efficiency.

How the system works: Waste methane generated at Sierra Nevada’s water-treatment plant partially powers four 250-kilowatt direct fuel cell-combined heat and power units. Heat recovery units on each fuel cell, which exhaust at roughly 700° F, produce steam that is diverted into the brewing process, decreasing demand on the boilers. A 9,000-panel solar installation, now partially complete, will ultimately boost the brewery’s power capacity by another 1.4 megawatts.



California’s Sierra Nevada Brewing Company is self-generating 80% of its power through solar panels and biogas from waste water treatment.

The tally of economic and environmental benefits: The company has reduced its fuel costs by up to 40% and cut electricity purchases by 50%. It can now self-generate up to 80% of its energy needs and sell any surplus back to the utility.

The project’s initial cost was roughly \$16 million, but with tax credits, accelerated appreciation, offsets and rebates, the total cost to Sierra Nevada is less than \$5 million.

All of the technology used in its integrated power-generation system is widely available to other types of food processing and manufacturing facilities.

### Institutionalizing energy efficiency

**How this is innovative:** By creating a required, systematic process for energy efficiency upgrades, and backing it up with a \$40 million annual fund, Johnson & Johnson has operationalized its corporate carbon reduction strategy at 200 subsidiaries.

It is no small feat to reduce energy use and carbon emissions across a multinational corporation, while still growing sales. Johnson & Johnson, a leading provider of health-care products and related services with more than 200 subsidiary companies in 57 countries, provides a unique example of success: It instituted a corporate strategy for carbon emissions reduction, backed up by a ten-stage checklist for increased energy efficiency at all its facilities and a \$40 million annual fund to support greenhouse gas (GHG) emissions reduction projects.

The company reports dramatic results. From 2003 to 2006, total sales increased 27% while energy use increased by only 0.5%, which means the energy intensity of sales during the three-year period actually decreased 21%.

A cornerstone of this effort is the ten-stage checklist, known as EBP or Enhanced Best Practices. Adapted from the U.S. EPA's Energy Star standards, it includes 245 potential energy-saving facilities upgrades. Each of Johnson & Johnson's subsidiary companies is expected to implement all feasible upgrades that have a return on investment of less than five years.

When subsidiaries identify projects with a longer payback period, they can apply for financing from the \$40 million annual fund, effectively removing two of the most common impediments to GHG reduction projects: limited capital availability and short payback period requirements for capital investments.

In 2006, 20 capital projects were financed by the fund, which are reducing a total of 34,500 metric tons of GHG emissions each year. Over the past



Johnson & Johnson subsidiary ALZA Corporation purchases methane gas from the local municipal landfill to fuel its co-generation system.

decade, Johnson & Johnson saw an estimated \$30 million annualized savings because of projects financed through the fund, which have an average return rate of 16%.

Newly acquired subsidiary companies have three years to begin optimizing energy efficiency and reducing emissions. Johnson & Johnson will also provide its Enhanced Best Practices materials free of charge to other interested companies.

GAME-CHANGER

The closed loop

How this is innovative: Though still at an early stage, this example illustrates that closed-loop manufacturing is within reach.

The pinnacle of efficient product manufacturing is the perfect “closed-loop” system, in which worn-out products can be remade as new similar products, without downgrading the source material to a lower-level use or padding with high proportions of virgin materials.

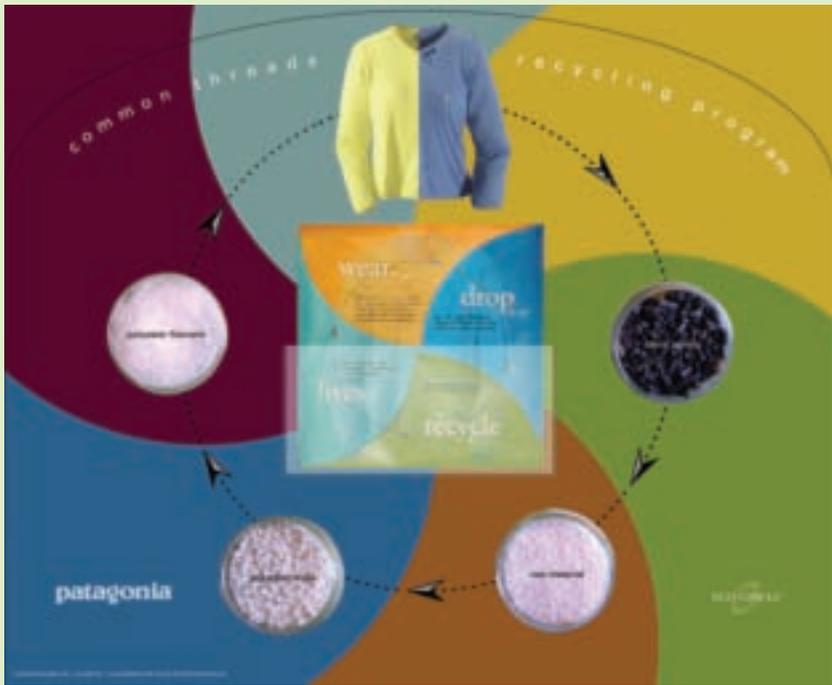
Outdoor apparel maker Patagonia is breaking ground on a new model that could do just that. Through its Common Threads program, customers are encouraged to return worn-out polyester and cotton garments to a Patagonia retail store. The company sends them to its manufacturer where they are broken down into fibers and rewoven into new textiles to feed back into Patagonia’s garment manufacturing process. The company reports that the resulting garments will perform the same as virgin-fiber garments and can be recycled again and again.

This closed-loop system reduces solid waste, demand for petroleum (to manufacture synthetic fabrics and grow cotton) and energy consumption. Patagonia estimates that production of the recycled fiber uses 76% less energy and produces 71% less CO<sub>2</sub> emissions than production of virgin polyester.

Patagonia began Common Threads in 2005 and is currently in early commercialization. If successful in the long term, the program could generate strong business benefits.

“Simplifying a material’s palette for sustainability reasons reduces supply-chain complexity, shrinks the vendor count, generates volume discounts and improves the service of suppliers as more business is sent their way,” Gregory C. Unruh of Thunderbird School of Global Management wrote about Patagonia in an executive briefing for Harvard Business School.

In the near term, the program is generating positive reputational benefits among environmentally-minded consumers and is a test case for a wide range of products.



common threads  
recycling program

Patagonia customers can now turn in worn-out cotton and polyester garments, which the company recycles into new garments.

# Fleet management

Transportation is a significant contributor to global warming pollution worldwide. In the United States, nearly a third of CO<sub>2</sub> emissions come from cars, trucks, planes and other single and multi-passenger vehicles. For this report, we reviewed recent innovations in air, shipping, rail and ground transportation. Especially impressive were the economic and environmental gains achieved by corporate fleet managers just by monitoring their activities and tinkering with a few engines. It seems paying a little extra attention to your vehicles can make a big difference. Haven't heard of telematics? Read on.

## High-tech tools boost fuel efficiency

**How this is innovative:** With short payback periods and high ROI, telematics systems are an attractive option for sales, service and delivery fleets.

Managing fleets is becoming an increasingly high-tech business. Multiple technologies (such as diagnostic software, wireless telecommunication and location trackers) are converging into a powerful suite of tools known as telematics.

Fleet managers across industries are using telematics systems, available commercially from a variety of

vendors, to gather data that can identify opportunities to slash costs, while improving service and environmental performance. Eliminating idling time and speeding, thereby decreasing CO<sub>2</sub> emissions and increasing fuel efficiency, are just some of the benefits.

A 2008 report by *Automotive Fleets* found that companies adopting telematics systems paid back their investment in one year or less, with a substantial return on investment, ranging from 2 to 10 times ROI.

UPS is currently testing a custom system that uses slick algorithms and proprietary firmware to analyze a stream of data—everything from speed, RPMs and oil pressure to seatbelt use and the number of times a truck is placed in reverse. This data helps determine the precise time to bring trucks in for maintenance—and when to place a truck that is beginning to perform less efficiently on a shorter route.

And the UPS system is motivating drivers to adopt “greener” behavior. At two pilot sites last year, drivers reduced the amount of time spent idling by 24 minutes per driver per day—a fuel savings of \$188 per driver per year. With more than 90,000 drivers in the UPS fleet, the savings could be significant.

Fleet-management companies, such as GE and PHH Arval (which partnered with Environmental Defense Fund on a related project, see page 29), also offer telematics to their clients. PHH Arval reports its onboard system improves fuel efficiency by up to 10%.



Telematics systems can save fuel and reduce emissions for any type of vehicle fleet.



Fleet managers can employ a variety of technologies and low-cost solutions to increase fuel efficiency.

Some 2.5 million telematics units are in service, a number expected to double by 2009. Other early adopters include FedEx, GEICO, Ryder, ServiceMaster and Wal-Mart.

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#### WHAT EVERY COMPANY SHOULD CONSIDER

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##### **Reducing truck speed**

**How this is innovative:** A simple engine modification can yield big savings.

Staples bolstered its fuel mileage, lowered its maintenance costs and reduced its greenhouse gas emissions simply by tinkering with its truck engines.

Mike Payette, fleet equipment manager for the office-supply chain, worked with his manufacturer, Isuzu, to reprogram his engines so that they can not exceed 60 miles per hour. Using a specially programmed diagnostic tool connected to the

engine control module, or ECM, Isuzu was able to make this adjustment throughout the fleet, which consists of class four to six trucks of various model years, at no cost to Staples.

Fleet efficiency has increased from approximately 8.5 to at least 10 miles per gallon. That's an overall improvement in fuel economy of at least 15%. Staples anticipates saving as much as 500,000 gallons of diesel per year due to this change.

# Packaging

Companies are rethinking their packaging, using fewer and lighter materials, dramatically increasing recycled content and redesigning products to reduce the need for packaging in the first place. In doing so, they're growing the bottom-line. Companies pay less for raw materials (paper, glass, metals and petroleum-based plastic), reduce shipping costs, fit more products on the shelf and reduce inventory requirements. They also help conserve virgin resources, prevent unnecessary CO<sub>2</sub> emissions and curb the disposal of wrappers and containers, which comprise almost one-third of the nearly 80 million tons of garbage generated each year in the U.S.

## Making more by selling less

**How this is innovative:** Packaging, and the products themselves, can be redesigned to reduce weight and volume, cutting costs and environmental footprint.

Designers are streamlining product packaging, creating food, beverage and other containers that generate less waste from warehouse to table. This trend, called dematerialization, reduces the weight and volume of a package by essentially using fewer materials.

Look at recent changes in yogurt packaging, pioneered by Stonyfield Farm. After commissioning

a series of lifecycle assessments on its packaging, including one specifically on different closure options for its single-serving yogurt tubs, Stonyfield switched from plastic lids and inner seals to single-layer aluminum foil closures. The foil tops are lighter and require less energy and water to produce. The switch ended up saving Stonyfield more than \$1 million a year. When other yogurt manufacturers realized they could cut costs without compromising quality, the change spread throughout the industry.

Similarly, dematerialization is catching on in the beverage industry. Crown Holdings, a supplier of aluminum cans, developed a new design that requires 10% less aluminum than comparable products—without changing the diameter of the can neck and avoiding costly equipment replacements or new shipping packaging. More than 100 million of these SuperEnd<sup>®</sup> can ends were produced between 2001 and 2006, reducing aluminum use by 25,000 tons.

## Slimming down the products themselves

Re-engineering products to reduce the need for packaging is an important related trend. General Mills changed the shape of the noodles in Hamburger Helper, for example, which reduced the volume of the package by 20%. General Mills estimates that this is saving 890,000 pounds of paper fiber annually and reducing shipping volume enough to keep 500 trucks off the road each year.



Stonyfield Farm set off a wave of change in yogurt packaging when it removed the plastic lid.

Similarly, Wal-Mart (an Environmental Defense Fund partner) collaborated with Procter & Gamble, Unilever and other major laundry-detergent makers to sell liquid laundry detergent only in concentrated form. Eliminating substantial water content from the soaps considerably cut packaging and shipping volume. Wal-Mart estimates a savings of 400 million gallons of water, 95 million pounds of plastic and 125 million pounds of cardboard over the next three years as a result of the switch to concentrate. The reduction in shipping volume is expected to reap additional environmental benefits.

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#### WHAT EVERY COMPANY SHOULD CONSIDER

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#### Breaking the post-consumer recycled barrier

**How this is innovative:** FDA approves first-ever post-consumer recycled (PCR) material in food packaging; beauty product bottles hit 95% PCR.

In two industry firsts, Aveda and Starbucks upgraded certain product packaging to include more post-consumer recycled materials—plastic and paper, respectively—than previously thought possible.

For its new line of men's products, Aveda introduced bottles made almost entirely of repurposed milk jugs, or high-density polyethylene (HDPE). At 95% HDPE, these bottles contain the highest level of post-consumer recycled materials in the industry; the other 5% is coloring. Aveda says it isn't paying more for its plastic than before, but it was a challenge finding suppliers because less than 30% of virgin HDPE bottles are recycled in the United States. Aveda estimates the new bottles will save 15 tons of virgin HDPE annually over its old men's line, which was 80% post-consumer recycled material. Owned by parent company Estee Lauder, Aveda plans to introduce higher levels of recycled content to its other product lines.

Meanwhile, Starbucks has phased in a new coffee cup made of 10% post-consumer recycled paper, a first for the food and beverage industry. Following its partnership with Environmental Defense Fund

in the 1990s, Starbucks spent years obtaining FDA clearance to use post-consumer fiber, which was finally granted in 2004. The resulting cup, developed with supplier Mississippi River, looks and performs the same as the all-virgin-paper cup it replaced.

The new cup costs slightly more, but Starbucks believes prices will fall as the market for post-consumer recycled fiber grows. Until then, it's worth the extra cost: In 2006, the switch reduced the cups' environmental footprint by the equivalent of 78,000 trees, the energy to power 640 homes for a year, the water to fill 71 Olympic-sized swimming pools and 109 garbage trucks of solid waste. Starbucks expects its 2007 numbers, currently being tallied, to increase.

Starbucks secured FDA clearance to add post-consumer recycled paper fiber to its hot cups, paving the way for other beverage sellers.



# Information technology

The energy needed to run the world's data centers and server farms is spiraling out of control. If current trends continue, the EPA estimates data center energy consumption will grow by 12% per year, sending costs and carbon emissions through the roof. Major players in all camps—server manufacturers, federal agencies, end users—are scrambling to minimize energy demands and the resulting costs. Yet creative opportunities—from virtualization software to green buildings and solar power—can change the equation.

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## GAME-CHANGER

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### Solar-powered web hosting

**How this is innovative:** Using a suite of high- and low-tech solutions, a model data center proves that solid uptime performance and zero carbon emissions are possible.

A southern California data center is upping the green ante in the web hosting market with the first fully solar-powered data center. Affordable Internet Services Online, or AISO.net, has achieved this feat through a creative blend of green design and leading-edge technologies.

The 2,000-square-foot facility draws power from 120 solar panels, which supply electricity to both AISO's office and server farm.

Though located in the desert, a unique cooling system keeps the server room at a constant 65-70° F with minimal energy use. A water-cooled air conditioning system works in concert with natural air cooling. When the temperature outside drops to 50° F or below—as it frequently does at night—a custom cooling exchanger blows in filtered outside air.

Maximizing server capacity is also a factor in the AISO.net equation. Typical servers are assigned one specific task, which means that, on average, they operate at less than 10% capacity. AISO, on the other hand, uses virtualization software to allow one server to host multiple applications—achieving an impressive 75% capacity.

Additional features include solar tubes which pipe in natural light, 12-inch walls and high grade insulation. A green roof, currently in the design phase, will further reduce the company's energy needs.

Although the data center cost 60% more than a standard site to build, AISO.net CTO Phil Nail says the investment is paying off. The company is saving approximately \$3,000 a month in utility bills and has cultivated a loyal base of 15,000 clients worldwide looking for greener web hosting.



The average data center is 40 times more energy intensive than an office building.

## Finance

CFOs who think the cost of green building or retrofitting isn't worth it should think again. In addition to the environmental benefits and energy savings, obtaining certification through U.S. Green Building Council's LEED program (Leadership in Energy and Environmental Design) could ultimately result in lower insurance premiums.

### Insuring green buildings

**How this is innovative:** New insurance products acknowledge the superior quality and special features of green buildings.

The insurance industry is starting to encourage commercial policyholders to go green.

In an industry first, Fireman's Fund launched Green-Gard<sup>SM</sup>, special coverage for certified commercial structures nationwide that the company believes will encourage safe, energy-efficient construction and repairs and give it a competitive advantage. This suite of three products features Certified Green Building, which restores a green-certified property to its original condition following a loss, including alternative energy systems.

"If there's a fire and the building has been selling energy back into the grid, we will pay for that loss of income," Steven G. Bushnell, product director for commercial business at Fireman's Fund. The policy also pays the cost of buying power from the grid while the alternative energy system is repaired.

The price of this green coverage is similar to—and in some cases 5% less expensive than—existing property-loss policies. Fireman's Fund studies show that green structures present fewer property risks than traditional ones because the commissioning process, required for LEED certification, addresses the major causes of commercial loss: electrical fires, plumbing leaks and heating, ventilating and air-conditioning (HVAC) failures.

A related product, Building Commissioning Expense, recommissions heating and cooling systems after a loss in order to meet the LEED standard.



Higher quality construction and mechanical and electrical systems make LEED certified buildings less risky to insure.

And the Green Real and Personal Property Upgrade product pays for a conventional building to be rebuilt with green alternatives following a loss. Travelers has recently followed suit with a similar product, called Green Building Coverage Enhancements, for mid-size buildings.

"For building owners, such coverages further validate the continuing viability of green and sustainable practices in building design, construction and management," the editors of *Buildings* magazine wrote. "In addition to protecting the bottom line, owners have been given another tool to increase their buildings' asset value and attract high-quality tenants."

# Human resources

Why would a company that already offers employees an attractive benefits package devote extra resources to seeking out environmental perks? Because green benefits are proving to be more than just a nice line in the annual report: They are enhancing employee productivity, morale and recruitment.

## The culture of telecommuting

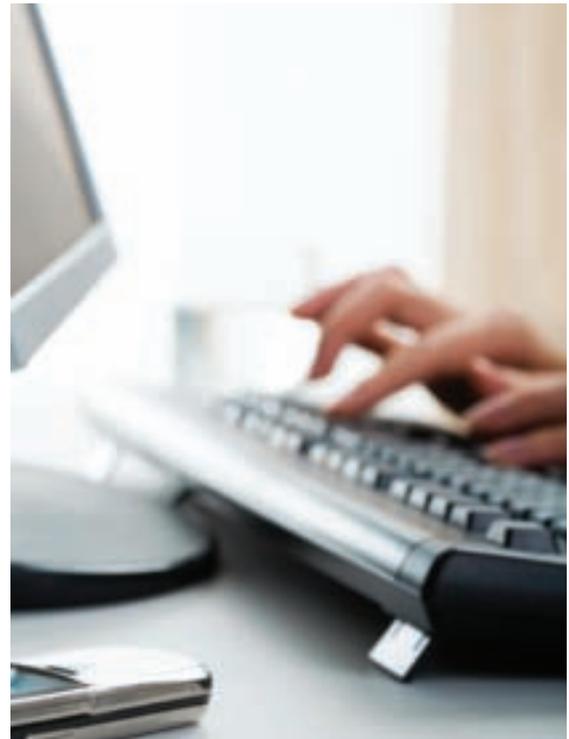
**How this is innovative:** Boosting employee telecommuting rates can reap business and environmental benefits.

Telecommuting isn't often thought of as a green concept, but some estimates say employee travel to and from the office accounts for roughly one-fourth of carbon emissions from office operations.

The good news: Statistics compiled by the Telework Coalition show that more than 44 million Americans are avoiding commuting by doing at least some work outside the office. Organizations with remote employees report increased productivity, more competitive recruiting, lower real-estate costs, higher morale, better retention rates and less stress on the environment. But few have yet to embrace telecommuting as fully as Sun Microsystems and IBM, which pioneered the practice a decade ago and have since adopted virtual work policies into their corporate cultures.

Sun Microsystems began its "open work" program in 1995, allowing new hires to decide where they'd like to work when they negotiate their offer letter. The company, which provides open-source network solutions and services, now employs 20,000 people—55% of its workforce—who either are based primarily at home or divide their time between a Sun office and a home office.

In 2006, Sun saved close to \$68 million in real estate and related operating costs and increased worker productivity by 34%. Sun also reduced its corporate



Promoting telecommuting can increase employee productivity and morale while reducing a company's carbon footprint.

CO<sub>2</sub> emissions by 29,000 tons, because more than half of its employees don't commute daily or put demands on office heating and cooling systems.

Of course, technology helps companies make telecommuting possible. Sun asks remote employees to report to work through a virtual private network and a virtual desktop using a secure Java-enabled card ID. Files are stored on a central server rather than individual PCs. Sun established a consulting

practice to help other businesses set up similar virtual workspace programs.

IBM, which started its program in the mid-1990s, now employs 121,000 people—40% of its global workforce—who do not maintain an office within the company. As a result, the multinational computer company and consultancy saves an estimated \$100 million a year in on-site costs alone. Without a location barrier, IBM has expanded its recruiting opportunities. Its workers also get more done.

“We don’t manage by whether you’re sitting at your desk, we manage by whether you’ve produced the deliverables,” Jaci Moss, IBM human resources director for Lotus software said in an analyst’s report for Veritude. Moss added that employees spend time working instead of commuting, and they work hard so this benefit will continue.

According to *Fortune* magazine, 79 of the “100 Best Companies to Work For” in 2006 allowed employees to work from home at least one day a week. Republic Bancorp, HomeBanc Mortgage, American Fidelity Assurance, Morrison & Foerster and S.C. Johnson had the highest percentages of remote workers, ranging from 23–60%.

### Company-run transit

**How this is innovative:** Companies are moving beyond traditional carpool and transit subsidy programs by operating their own bus services.

Several high-tech companies have jumped on the employee-shuttle bandwagon—or, more appropriately, bus—to provide commuters with a calmer, greener and faster means of getting to and from work.

Companies decline to quote costs, but generally say the investment is a small price to pay for the recruiting advantages and retention rates, reductions in regional traffic congestion and air pollution and improvements in the quality of life and overall happiness of their employees.



The popular “Green Guzzler” biodiesel bus transports approximately 350 Yahoo! employees each weekday, removing single-passenger cars off Silicon Valley’s crowded highways.

“Of the more than 3.3 million people in the [San Francisco] Bay Area who commute to work each day, more than 70% of them drive to work alone,” says Christine Maley-Grubl, executive director of the Peninsula Traffic Congestion Relief Alliance. “Bay Area commuters spend more than 155,000 extra hours in traffic—that’s 17 years and more than \$1.8 million of wasted productivity per day.”

Google shuttles about 1,200 workers in the San Francisco Bay Area (nearly a quarter of its local workforce) to its Mountain View, California, offices. All rides are free. Its 32 buses are outfitted with wireless Internet access, allow dogs and bikes and take advantage of highway carpool lanes to achieve speedy commute times. All told, the buses log 4,400 miles a day with stops in more than a dozen cities. Google’s transportation planners regularly redraw routes to serve new hires.



High-definition telepresence systems, like this one from Cisco Systems, offer a no-delay experience in which meeting participants feel like they are in the same room.

Similarly, Yahoo! offers its own wifi-equipped employee buses, using biodiesel-powered vehicles. Yahoo!'s fleet, including the popular "Green Guzzler" which serves employees living in San Francisco, transports some 350 employees between several cities and the company's main office in Sunnyvale. Yahoo! also provides direct shuttles from area train stations, allowing employees to ride systems like Caltrain, BART and Amtrak to get to work.

And not to be left out of the bus business, Microsoft launched in September its own service for its employees in the Seattle metro area. Known as The Connector, this 14-bus service ferries up to 1,000 employees from around the greater Seattle area to and from its headquarters in Redmond, Washington. Many of the coaches sport bike storage, wireless Internet and power outlets at each seat. (Microsoft also operates hybrid cross-campus shuttles.)

In addition to providing a convenient way for employees to commute to work, Microsoft estimates The Connector will eliminate approximately 800 vehicle trips and 32,200 miles of travel each day—resulting in an estimated 3,800-ton reduction of CO<sub>2</sub> emitted annually.

### **Advanced teleconferencing to reduce travel**

**How this is innovative:** New technologies may virtually eliminate the need for business travel.

Business travel can be a huge drain on productivity and quality of life, budgets and the planet. Although conference calls and videoconferencing systems help, the next-generation solution promises to dramatically shrink time spent on airplanes, travel expenses and carbon footprints.

Known as "telepresence," these new, high-definition videoconferencing systems provide life-size, real-time communication with no perceived delays, giving users the sense of being in the same room together even when they are miles apart.

Cisco Systems and Hewlett-Packard offer the two leading products on the market, Cisco TelePresence and HP Halo Telepresence Solutions. Both companies use their own systems internally.

Industry leaders expect telepresence systems to be more widely adopted than earlier videoconferencing technologies because they offer a more immersive, reliable experience. They are also more user-friendly: They eliminate the frustrating signal lapses and the

intimidating jumble of wires, cameras and monitors commonly associated with older setups.

Whereas traditional videoconferencing systems were engaged only 5–10% of the time, assuming a ten-hour workday, the use of telepresence systems is nearly 50%, according to an estimate by Cisco. The environmental benefits from reduced jet travel for meetings could be similarly significant.

Pricing for telepresence systems vary, ranging in price from \$80,000–\$349,000 (plus a monthly service contract of up to \$18,000). Cisco is now rolling out a “Personal TelePresence” with a price point of less than \$40,000.

Users may see an even greater return on investment. Cisco estimates it saves nearly \$80 million per year through travel avoidance for company business. HP’s internal use reports show up to a 40% reduction in travel.

The investment pays for itself within the first year or two at most major corporations, as Howard Lichtmann, a research consultant who runs the Human Productivity Lab in Virginia, recently told *U.S. News & World Report*. Lichtmann also expects the prices of most telepresence system components, particularly bandwidth, to continue dropping.

Early adopters to this technology include AIG Financial Products, Applied Materials, DreamWorks, McKesson, Proctor & Gamble, SAP, Telstra and Wachovia Bank.

Smaller businesses that still can’t afford to buy the gear will have access to telepresence systems: Regus, the world’s largest provider of outsourced workspaces, will install Cisco TelePresence systems in major business cities around the world.

Similarly, HP has inked a deal with Marriott International to install the Halo system inside public “telepresence rooms” in hotels and major business centers worldwide.



HP Halo Collaboration Studios are being installed at individual company sites and will soon be available at hotels and major business centers worldwide through a partnership with Marriott International.

Both HP and Cisco report increases in internal productivity, such as faster decision making and improved quality of life for their employees, who can now put all that time they used to spend traveling to better use.

Overall sales of telepresence systems are expected to grow from \$72 million in 2007 to \$1 billion by 2011.



# Innovations by industry

Creative, adaptive companies from a variety of industries are pioneering a new, greener “business as usual,” rethinking how they deliver their products and services and staking out new territory in the marketplace. Whether they are pursuing incremental efficiencies or more radical business model innovations, these companies are accelerating the rate of industry change.

## Shipping

### Reducing jet fuel consumption

**How this is innovative:** If taken to scale, a new flight pattern could chip away at greenhouse gas emissions from airplanes.

How a pilot lands a commercial jet can radically alter fuel consumption, noise pollution and emissions.

In January 2008, UPS pilots started using “continuous-descent arrivals” (CDAs) at two airports (Louisville and Sacramento). This new procedure eliminates the repeated engine thrusts required to execute the standard “step-down” descent from cruise altitude. In a continuous descent, the aircraft glides along a three-degree downward slope, with the engine nearly at idle, until the plane is approximately ten miles from the runway, at which time pilots power up the engines again for landing.

UPS says its CDAs conserve between 250 and 465 pounds of fuel per flight, depending on the size of the plane, which will mean a savings of as much as one million pounds of fuel per year if UPS fully implements CDAs at Louisville.

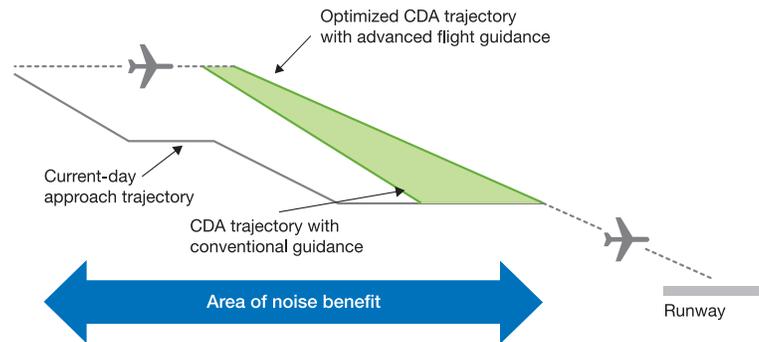
In addition to saving money on fuel, freight and passenger jet companies can benefit from increased efficiency, capacity and safety. Initial UPS tests show a savings of two to four minutes on the final 100-150 miles of flight and an increase in landing capability of up to 10-15% by maximizing the possible landing slots.

UPS plans to expand the method to other airports. FedEx is also using CDAs at select airports.

In addition to Louisville and Sacramento, the Federal Aviation Administration (FAA) has approved continuous-descent arrivals in Atlanta, Los Angeles, Phoenix and Salt Lake City, with plans for further expansion.

According to the FAA, tests conducted at Atlanta Hartsfield International Airport show savings of 1,300 pounds of CO<sub>2</sub> per flight, and noise levels from three to six decibels lower within 25 miles of the airport.

### Continuous-descent arrival (CDA)



By eliminating the engine thrusts required for the standard “step-down” descent, the continuous-descent arrival (CDA) saves fuel. CDAs also reduce noise and increase airport landing capacity.

## Retail

### An outlet for e-waste

**How this is innovative:** A national retailer offers a convenient drop-off location for unwanted computers that could boost low recycling rates.

Staples Inc. is the first national retailer to offer an everyday consumer recycling program for computer and technology waste.

The office-supply stores accept most old equipment, except for televisions and floor-model photocopy machines, regardless of brand or where the item was purchased. Customers simply bring the gear to the customer service desk at any of its 1,400 locations during store hours. Staples charges a \$10 fee for large pieces, but takes small PC peripherals for free.

“An estimated 133,000 computers are discarded every day in the United States,” said Mark Buckley, Staples’ vice president of environmental affairs. “We know that small businesses and consumers want to recycle their used office technology but are often frustrated by the lack of convenient options available. By making it easy to recycle, Staples helps customers take action in handling e-waste in an environmentally responsible way.”

The retailer, which says the program drives foot traffic, has already recycled two million pounds of technology products since May 2007. Electronics recycler Eco International (formerly Amandi Services) is disposing of all equipment in a manner that follows the standards set by the U.S. Environmental Protection Agency.

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### GAME-CHANGER

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#### Bags get sacked

**How this is innovative:** Moving past “paper vs. plastic” to “no free bags at all” is the next step for innovative retailers.

Grocery shoppers at Loblaw Companies Limited stores who want paper or plastic bags may need to bring their own. Last year, the Canadian food chain opened four “bagless” stores across the country.

With free bags no longer available, grocery shoppers at four of Canada’s Loblaws stores must bring their own bag or buy this reusable bag for 99 cents.



This is the first move by a major grocery retailer to completely remove all free disposable bags from checkout lines. It expects to divert approximately 15 million plastic bags in one year.

Loblaws sells a reusable bag made of 85% post-consumer waste (from beverage bottles) for 99 cents. The company has sold nearly 12 million reusable bags to date through its more than 1,000 stores.

Loblaw’s financial services arm, President’s Choice Financial, also awards points on its debit or credit card for each reusable bag used—including those of their competitors.

Similarly, the first year of IKEA USA’s “Bag the plastic bag” campaign was well received. Ninety-two percent of customers said “no” to single-use bags, opting for IKEA’s reusable blue bag (sold for 59 cents) or an alternative brought from home. Based on these results, IKEA will phase out all single-use bags in its US stores beginning this October.

Meanwhile, Whole Foods Market eliminated the plastic bag option in its 270 stores on Earth Day (though it will continue to offer paper bags). The retailer sells different types of reusable bags, including a canvas sack and a post-consumer plastic one.

## Food & agriculture

### Food waste = energy

**How this is innovative:** While commonly used to generate energy from agricultural waste, anaerobic digesters can do the same with food scraps.

Why throw food scraps away when you can turn them into energy? Not only does food waste tax landfill capacity, but when left to rot, it releases methane, a potent greenhouse gas.

Taking a cue from the agricultural sector, food-industry innovators are starting to invest in anaerobic digesters—large tanks in which bacteria break down organic material and produce natural gas for energy.

Bellisio Foods is one of the first. The maker of Michelina's and other national frozen meal brands is now building its second 5.25 million gallon digester at its production facility in rural Ohio. When complete, the company estimates that it will process all of its food waste each day, generating enough power to run two of the plant's nine boilers and reducing its total greenhouse gas emissions.

The \$6 million project is a major capital investment, but one that some state incentives and Bellisio Foods' long-term vision make possible. After an estimated four and a half year payback period, the company expects to save roughly \$1.3 million a year in energy, landfill and transportation costs.

With food waste accounting for 26% of total edible food in the U.S., such efforts could play a significant role in reducing landfill demands and curbing emissions.

## Banking & finance

### Leading banks begin facing climate change

**How this is innovative:** Moving companies and consumers from fossil fuels to more sustainable alternatives requires banking sector leadership.

America's major financial institutions are beginning to take on climate change. From pledging substantial investments in renewable energy to launching green retail products, banks are carving out opportunities to manage risks and capitalize on new technologies.

Most notably, Bank of America is the first financial institution in the world to set a greenhouse gas reduction target—a 7% reduction in its energy and utility portfolio by 2008 (from a 2004 baseline). To do this, the bank is reformulating its portfolio mix, adding more renewable and low carbon energy projects. While the 7% target leaves room for improvement, it sets a precedent that will hopefully influence other financial institutions to put limits on their financing of fossil fuels.



Location efficient mortgages give borrowers an incentive to buy properties in areas where they can walk to work or take public transportation.

Additionally Bank of America and Citi have independently made major recent commitments. Both announced 10-year, multi-billion initiatives (\$31 billion and \$20 billion respectively) that will invest in clean energy, alternative technologies and sustainable business practices.

### Green mortgages

Environmentally-friendly mortgage products are offering some good news in an otherwise gloomy lending market. Often called “green mortgages,” these loan programs are helping correct longstanding disincentives for purchasing more efficient and, ultimately, less costly properties.

Location-efficient mortgages (LEMs) aim to reverse the trend of would-be urban—or, in areas like Silicon Valley and Los Angeles, suburban—dwellers house hunting miles and miles from their jobs in order to find an “affordable” home. This definition of “afford,” however, fails to take into consideration transportation costs in terms of dollars and environmental sense.

LEMs give borrowers credit for living in places where residents can routinely walk to stores, schools, parks and public transportation and therefore don't need to drive as much. A typical LEM household might drive one-third to one-half less than others in a given year.

Although LEMs have been around for several years, they have not yet been widely used, largely due to the relaxation of the credit market. But, in light of the current mortgage crisis, LEM backers hope these mortgages can be used to expand the opportunities for home ownership in a responsible way.

Fannie Mae has agreed to invest at least \$100 million in LEMs in the greater metropolitan areas of Chicago, Los Angeles, San Francisco and Seattle.

Analysts predict LEMs can boost public transit ridership, reduce energy consumption and improve local and regional air quality, as well as encourage the development of more efficiently designed communities.

Similarly, Energy Efficient Mortgages (EEMs) help homebuyers to buy a new home with energy saving features, while Energy Improvement Mortgages (EIMs) finance upgrades to existing homes.

Bank of America has jumped on the bandwagon: Through its new Green Mortgage Program, homebuyers receive a reduced interest rate or \$1,000 back for each home-purchase mortgage meeting Energy Star specifications.

## Insurance

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### GAME-CHANGER

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#### Auto insurance by the mile

**How this is innovative:** A new type of insurance introduces a financial incentive for driving less.

Imagine if we paid for car insurance based on how much we drive? Would we drive less and, if so, get into fewer accidents and generate less pollution?

The 19 insurers worldwide offering some form of "use-based" insurance are answering these questions affirmatively. Studies show that if the full cost of car insurance is converted to a per-mile basis—while still accounting for traditional rating factors—use-based insurance can reduce driving by 10-15%.

And fewer miles driven equals less risk to the insurer: A 10% decrease in driving nets an estimated 17% decrease in crashes.

With this type of policy, a vehicle's premium goes up or down based on the number of miles logged, which can be verified by a certified odometer reading. A \$1,200 annual premium, for example, might become a 10 cent per mile premium.

While stopping short of full distance-based pricing, Progressive and GMAC are currently testing variations of this concept in the U.S., tracking miles driven using onboard computers.

Progressive, which offers a policy called TripSense in Oregon, Michigan and Minnesota, says clients who plug a sensor into their car's onboard diagnostics port save up to 25% on their coverage for driving less. GMAC, which is testing the program with its OnStar system in three states, says customers can lower their premiums by up to 40%.

Before these programs can be implemented nationwide, however, many states need to change laws or regulations to allow for this type of insurance plan.

# Environmental Defense Fund innovations

For nearly 20 years, Environmental Defense Fund has been working with leading businesses to create innovative tools to improve their environmental performance. For all our partnerships, our goals are the same: To find environmental and business “win-wins” that create a ripple effect throughout industries and, ultimately, help green the global supply chain.

Some of the innovations we’ve created with our partner companies over the past year include the following.

## Greener fleet management

Leading Fortune 500 companies—including Abbott, DuPont and Owens Corning—are discovering new sources of efficiency by rethinking how they manage their sales and service vehicles. Last year, Environmental Defense Fund partnered with PHH Arval to create the industry’s first comprehensive green fleet management strategy.

Known as PHH GreenFleet, the program provides a five-step framework for increasing average fleet fuel efficiency, decreasing emissions, reducing operating costs and using savings to offset remaining emissions. Participating companies realize major improvements through minor adjustments in how they select vehicles, conduct routine maintenance and train drivers.

Infinity Property and Casualty Corporation, a Birmingham, AL-based personal auto insurer, became the first PHH GreenFleet participant to operate a climate neutral fleet. It did so by replacing the Jeep Liberty with the more efficient Jeep Compass and offsetting the remainder of its emissions by investing in a project that reduces methane pollution on California dairy farms.

To date, more than 60,000 vehicles have utilized the program’s tools. Fleets that have fully implemented the program have reduced their emissions on average by 14% and lifecycle operating costs by 4%.



Matt Lefeld of Owens Corning helped the company implement the GreenFleet program, which resulted in a 21% increase in average fleet fuel efficiency and 14% emissions reduction. *Photo: Chris Ayers*

## Safer nanotechnology

Nanoscale materials hold great promise in fields from energy to medicine, but there are significant questions about their potential health and environmental risks. In partnership with DuPont, we recently developed the Nano Risk Framework: a comprehensive process for assessing, managing and communicating potential lifecycle risks of engineered nanomaterials.



*Top photo:* DuPont's Terry Medley (right) and Environmental Defense Fund's Scott Walsh present the Nano Risk Framework. *Bottom photo:* Wal-Mart buyers can now reward sustainable packaging. Pictured, concentrated detergents, requiring less packaging, line Wal-Mart's shelves.

The Framework offers guidance on the key questions an organization should consider in developing applications of such materials and on the key information needed to make sound risk-evaluation and risk-management decisions.

A wide range of stakeholders, from industry associations to government agencies, have welcomed

the Framework, and a number of major global corporations are considering adopting it. For example, Lloyd's of London recently encouraged insurers "to seek evidence of whether projects they are covering have followed this framework."

To download a copy and see examples of how DuPont has used the Framework in practice with real nanomaterials and real products, visit [NanoRiskFramework.com](http://NanoRiskFramework.com).

### **A scorecard for Wal-Mart**

This year, Wal-Mart launched the "packaging scorecard," a software tool that evaluates the environmental impacts of product packaging in Wal-Mart stores. With the goal of reaching Wal-Mart's target of a 5% decrease in packaging from 2008–2013, the scorecard is designed to incentivize suppliers to find new ways to ship and display their products.

Developed in collaboration with Environmental Defense Fund, the Sustainable Packaging Coalition, the EPA and other organizations, the tool scores each package on nine metrics including product-to-package ratio, GHG emissions from packaging production and shipping space utilization.

Wal-Mart buyers now have the ability to consider packaging scores when making purchasing decisions and will be evaluated on their efforts to attain the retailer's sustainability goals. To date, more than 6,000 suppliers of 97,000 products have inputted data, with more expected to follow.

### **Banks set higher bar for coal**

Citi, JPMorgan Chase and Morgan Stanley unveiled earlier this year the Carbon Principles, a set of investment guidelines for energy projects developed in collaboration with Environmental Defense Fund and the Natural Resource Defense Council. Power companies looking to build new coal plants will have to produce specific plans to reduce the projected carbon dioxide pollution. The costs for these mitigations will be reflected in project finance decisions.

# Methodology

Environmental Defense Fund's goal with this report is to highlight some of the most promising trends, best practices and innovative ideas that are ready for wider adoption and, if taken to scale, have the potential to generate significant benefits.

This assessment did not review overall sustainability programs, longtime successful initiatives or overall environmental performance of a company. It focused instead on specific new technologies, processes, products and services. We did not review programs that were the direct result of a partnership between Environmental Defense Fund and a company. Our innovations are presented separately on pages 29-30.

## Data Collection

To identify potential innovations for inclusion in this report, we “cast a wide net,” uncovering a wide range of environmental innovations across industries and corporate functional areas (e.g. operations, manufacturing, marketing, IT, supply chain management, etc.), and looked at the types of environmental and business benefits generated.

More than 230 innovation ideas were gathered through a three-step data collection process:

- **Expert interviews:** In-depth interviews were conducted with more than 40 academics, sustainability consultants, entrepreneurs, industry analysts, key Environmental Defense Fund staff and other experts.
- **Call for nominations:** We reached out to a broad audience of corporate environmental managers through the Global Environmental Management Initiative and NAEM via an online nominations form.
- **Literature review:** We conducted a comprehensive literature search, covering trade press, published academic research and industry reports.

## Assessment

A three-tier screening and evaluation process, incorporating both qualitative and quantitative data, was used to evaluate the pool of candidate innovations based on the criteria established for this report (see next page for criteria).

- **Tier 1:** We reviewed more than 230 innovations gathered through the data collection process for environmental benefits, business benefits and replicability. Those that failed to meet these basic criteria did not move to Tier 2.
- **Tier 2:** More information was collected from the companies involved and from third-party sources to verify and expand upon preliminary data. We reviewed the innovation candidates for their readiness for replication and applicability to other companies and industries. Internal and external technical and subject-area experts reviewed each candidate based on “innovativeness” relative to current best practices and the potential for greater impact.
- **Tier 3:** A preliminary slate of innovative ideas was sent to an Advisory Panel of high-level business and environmental experts. Additional information was gathered to address remaining questions and finalize the slate for inclusion in the report. (See inside front cover for list of Advisory Panel members.)

# Innovations criteria

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## Environmental Benefits

To what extent does the innovation generate one or more of the following environmental benefits?

- Greenhouse gas emissions reduced (e.g., carbon dioxide, methane, nitrous oxide)
- Energy use reduced or efficiency increased
- Hazardous pollutant releases to air, water or land reduced
- Solid waste reductions, materials use reduced or efficiency increased
- Supplier behavior influenced, resulting in environmental benefits
- Natural resources (land, water or wildlife) protected or restored
- Employee or consumer behavior influenced, resulting in environmental benefits

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## Business Benefits

To what extent does the innovation generate one or more of the following business benefits?

- Cost savings
- Increased revenues or earnings
- Reduced liability or risk
- Return on investment/payback period
- New market creation
- Investment attractiveness
- Employee retention or recruitment
- Benefits for customers
- Brand/reputation enhancement

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## Replicability

Is the innovation ripe for wider replication? Factors include:

- Applicability to more than one business sector or in wide-reaching business areas (i.e. retail, manufacturing or office environments)
- Commercial availability
- Stage of development (at least tested at the pilot stage and ready to be taken to scale)

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## Innovativeness

- Is the innovation original or does it provide a new twist on an existing practice?
- Has it yet to be widely discussed and documented?
- Is it not yet in widespread use?
- Does it offer opportunities for deeper market penetration?



