

FORTUNE

Sustaining the FUTURE

Can green strategies actually help companies become more competitive? It's a puzzle forward thinkers are trying to solve.



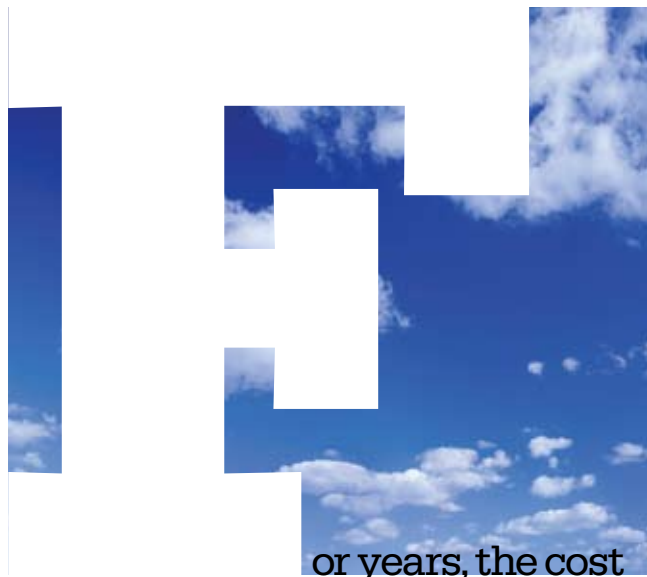
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For years, the cost of energy was something we'd fret over at the pump, not in the boardroom. Sure, the price of oil would fluctuate, and with every geopolitical flare-up we'd worry about our supply. Yet energy was still relatively cheap in the U.S., and business continued as usual.

There was little thought toward boosting energy efficiency, reducing emissions, or developing (and using) alternative sources of power. It was a long, prosperous, fossil-fuel-burning run—while it lasted.

Make no mistake: Energy use is no longer a no-brainer. Instead, it has become a key business driver, increasingly determining how, and where, companies operate. With worldwide demand soaring, oil prices are at record highs: more than \$93 per barrel at the end of October. And natural gas is becoming costlier, too, particularly in the U.S., where prices are higher than in many other parts of the world. Little surprise, then, that companies are moving where the cheaper energy is, often offshore. One has only to look at the chemical industry—highly reliant on natural gas—to

see that phenomena play out. Of the more than 80 new, large-scale chemical plants on the boards, none is planned for the United States. Dow Chemical has stated that its annual energy costs would be cut almost in half, from \$12 billion to \$7 billion, if it moved its U.S. plants to Germany, and moving to the Middle East would cut those costs to just \$1.5 billion.

What's becoming clear, too, is that energy isn't only a driver for business, it's also a driver for competitiveness. Every company that heads offshore doesn't just move its production lines; it moves skills. "That has a huge impact on their ability to compete," says Deborah Wince-Smith, president of the Council on Competitiveness, an organization based in Washington, D.C., that is bringing together leaders from industry, academia, and government to better understand, and address, the competitiveness issues arising from today's energy and environmental challenges. "Are they going to find the talent they need? That's not a given. And there's a huge impact, too, on our competitiveness here at home. If companies go offshore, will we be developing the talent we need to innovate now, and even more importantly, down the road?"

Meanwhile, companies that stay put can find their competitiveness impacted, too. Higher energy costs don't just raise prices—making products less attractive—they eat resources that could have been put toward other investments, such as research and development. In the end, it may not only be companies and consumers that will pay; it could be the leadership the U.S. has enjoyed in a host of industries. Already, we're seeing other nations becoming important forces in markets the U.S. has traditionally dominated. China, which produced just 5% of the world's steel in 1995, is expected to make more than 30% by 2015.

THE GREEN REVOLT

But there's a silver lining for forward-looking companies savvy enough to see it. Today's energy situation presents challenges, but also opportunities. While the worldwide demand for energy will grow dramatically—a staggering 57% increase by 2030, according to the Energy Information Administration at the U.S. Department of Energy—so, too, will the demand for sustainability. This doesn't just mean new and renewable sources of energy; it means using traditional sources in more efficient, more environmentally friendly ways, cutting

DID YOU KNOW... Of the 7% of total U.S. energy consumption attributed to renewable energy, 48% is from biomass,➔





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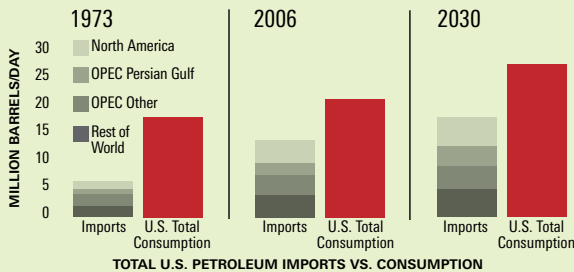
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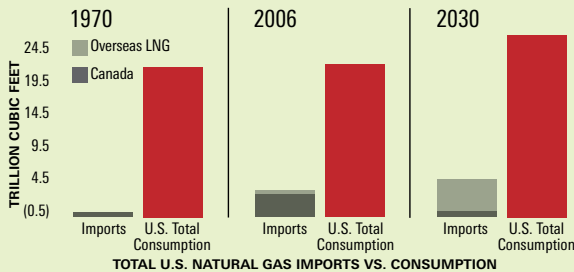


Trends to Watch

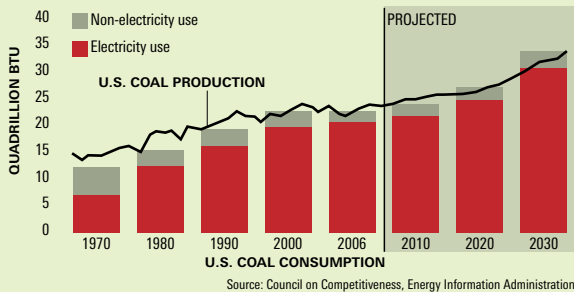
U.S. petroleum consumption will continue to rise... along with oil imports.



The U.S. will increasingly source natural gas from outside of North America.



Coal usage to produce electricity is on an upward trajectory.



down on the greenhouse gas emissions that contribute to global warming, species extinction, and extreme weather events. "The exponential growth in demand for energy offers extraordinary economic opportunities," says Dr. Shirley Ann Jackson, president of Rensselaer Polytechnic Institute. "The challenge for countries and corporations that wish to be competitive is to manage energy supply and demand in a cost-effective, sustainable, innovative way."

Increasingly, consumers want sustainability. Investors are looking for it, and businesses are embracing it—not just because it bodes well for the planet, but because it also saves money. An early leader in sustainability efforts, DuPont was able to reduce its greenhouse emissions by 72% from 2000 to 2004. That proved good for the environment and good for DuPont. "We avoided costs of over \$3 billion by holding our energy use 6% below 1990 levels, while production increased," says Chad Holliday, DuPont's chairman and chief executive officer.

Yet, saving money is just for starters. The big-business case for sustainability is that there is, indeed, big business in sustainability—for companies that go about it wisely. DuPont, for example, now attributes over \$5 billion of its \$27 billion in revenues to the sale of sustainable products.

By tackling the energy challenge in ways that foster sustainability, the private sector can not only keep pace in a tougher business environment, but pull ahead to find new efficiencies, develop new technologies, and build new markets. Skeptics need only look at the buzz for, and sales of hybrid vehicles.

"What we have today is a perfect storm for innovation," says Wince-Smith. "The price of energy, the volatility of the supply, the global awareness of climate change—it's all coming together to put energy security and sustainability on the front burner. We're starting to see a huge investment in the research that will deal with these challenges. It's that kind of innovation that will get us the results we want: a good energy supply from various sources, low cost, and a low carbon footprint."

One thing there's no shortage of is companies betting on sustainability. In March, IBM announced the creation of an all-new business unit, Big Green Innovation, to help companies tackle waste management, alternative energy options, and eco-friendlier operations. In May, GE Energy Financial Services announced that, by 2010, it will double its investments in wind, solar, biomass

42% from hydroelectric power, 5% from geothermal energy, 4% from wind, and only 1% from solar power. →



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(energy from biological materials, typically plants), and geothermal energy (generated by heat stored beneath the Earth's surface).

It's a bet America is making, too, looking to sustainability to solve our energy challenges and boost our competitiveness. It's no surefire wager, but we've got an ace up our sleeve. The companies, industries, and research institutions helping us win this bet have already hit on a number of key strategies. What they've found is that making sustainability work—for themselves, for the country, and for the world around us—requires long-term thinking, careful planning, and adherence to the following five principles.



vehicle paint shop—and redesigned it so that emissions are converted into electricity that helps power the plant. The process, called Fumes-to-Fuel, was launched in 2004 with a pilot installation at Ford's Dearborn Truck Plant in Michigan. The technology not only generates clean energy and reduces CO₂ emissions—it saves money, as paint fumes no longer have to be collected and incinerated, an expensive process.

This year, Ford installed an improved Fumes-to-Fuel system at its Oakville assembly plant, in Ontario, Canada. It currently uses an internal combustion engine to produce power that can be added to the plant's electrical

RULE NO. 1 | *Integrate a sustainability strategy throughout your business.*

There are plenty of relatively low-cost, low-pain ways for companies to cut their energy use and emissions. They can replace aging equipment—hardware that would need to be upgraded anyway—with more energy-efficient devices. They can switch from incandescent lights to low-energy fluorescents. They can recycle materials that would otherwise be thrown out.

The smarter, and more successful, approach, however, is to change your processes along with your equipment; and to think about the ways energy efficiency can be built into the core of your business. Consider Ford Motor Co.: since 2000, it has reduced its global operational energy use by 27% and its carbon dioxide emissions by 31%. In the U.S. alone, it has saved enough energy to supply 220,000 homes. It has done so through strategies both commonplace (switching out the light bulbs) and novel (using wind turbines to power its Dagenham Diesel Centre in Britain).

But Ford has also realized that the real improvements—and future—of sustainability won't come from tweaks on the surface but from deeper, integrated efforts that transform the very way companies do business. For example, Ford has taken one of an automobile plant's principal energy users—the

grid, but within the next year the company will migrate to a large-scale, 300-kilowatt fuel cell. That will enhance the system's effectiveness and reduce CO₂ emissions by 88%.

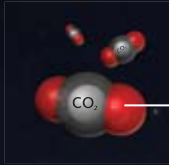
"Sustainability has to be totally integrated within a company," says Sue Cischke, Ford's senior vice president for sustainability, environment, and safety engineering. "You need to look at your facilities, your processes, your products. Where can you use more renewable material? How can you use less energy to produce something?" In the 2008 Ford Mustang, Ford is using seat foam made from soy-based material. That means reduced CO₂ emissions compared with petroleum-based materials. It also means using renewable content. "You need to look at how everything is put together," says Cischke, "and how you can do it in more efficient, more environmentally friendly ways."

RULE NO. 2 | *Collaborate across industries, and also with the public sector.*

In developing its Fumes-to-Fuel process, Ford teamed up with Detroit Edison. The pairing highlights another crucial factor in making sustainability efforts work: Partnerships are essential. "There are so many technologies that we're looking at, such as clean diesels, fuel cells, hybrid

ACCORDING TO the International Energy Agency, \$16 trillion will be invested in the energy sector by 2030.>





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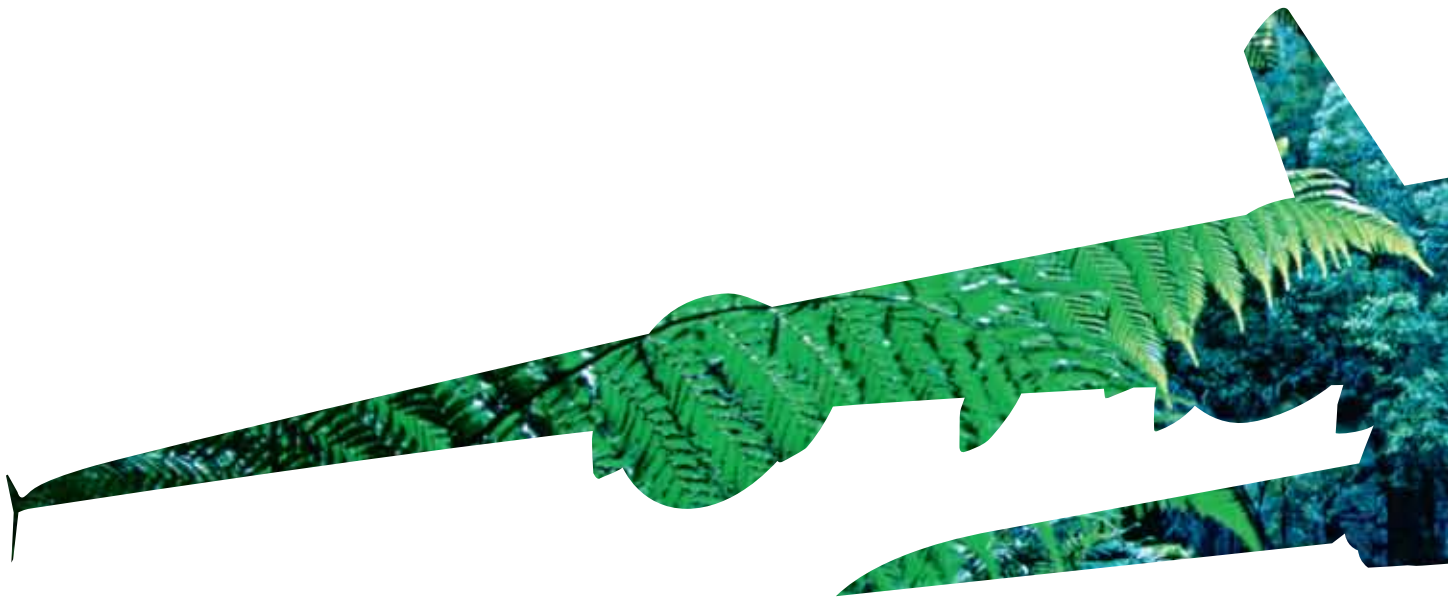


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vehicles," says Cischke. "By leveraging partnerships, you can spread out and get a better understanding of where you should place your bets."

Sustainability efforts can also cut across industry lines, adding to the importance of collaborations. Plug-in hybrid electric vehicles (PHEVs) are a promising—and potentially lucrative—new product category for automakers like Ford. Because their batteries can be recharged by plugging into an electric power source, rather than by charging off a combustion engine, fuel costs are reduced; electricity is cheaper than gasoline. But working with the electric grid adds complexities outside an automaker's expertise. So Ford is teaming with a major utility, Southern California Edison, to explore how the interaction between vehicle and grid will work. Together, they're investigating ways for a vehicle to not only charge off the grid but to provide power back to the grid when electricity demand is high and the vehicle is idle. "With a smart grid like the one Southern California Edison is developing, you'll be able to put power in and out as needed, which will result in more efficiency and also in better rates for users," says Cischke.

Collaborations with the public sector—particularly the government's big research labs—can also help spur advances, and market opportunities, in sustainability. At the Department of Energy's Oak Ridge National Laboratory, a long list of partnerships are underway, many leveraging Oak Ridge's renowned supercomputing facilities. "If current trends hold, humanity will use more energy in the next 50 years than in all previous recorded history," says Dr. Thomas Zacharia, associate laboratory director, computing and computational sciences, at Oak Ridge. "Current technologies will not keep up with that, and the only way to find solutions in a timely fashion is through supercomputing, where we can accel-



ate the development, design, and commercial viability of new technologies. We're helping automakers do research that will make possible more efficient combustion engines. We're looking at newer and improved techniques of energy production—from nuclear fission and fusion to renewables like biofuels."

Oak Ridge is also the U.S. lead for the ITER research project: a \$10 billion, seven-nation collaboration that is expected to run for three decades. ITER (Latin for "the way") hopes to demonstrate the feasibility, both technical and economic, of power from nuclear fusion—the process that heats the sun and stars. The project will build and run the world's most advanced magnetic fusion experimental facility, in Cadarache, France. Construction is expected to begin next year.

"This is something that clearly cannot be done without supercomputing," says Zacharia. "You need it for the designs; you need it for real-time feedback to control the plasma within the reactor." If successful, ITER will have important implications for sustainability. While technically not a renewable energy source, nuclear fusion uses deuterium, of which there is enough to last—even at the super-sized energy needs of the future—thousands of years.

RULE NO. 3. | *Be sure to green your company's supply chain.*

Buyers—whether they're big manufacturers purchasing parts for their production lines or consumers shopping in a supermarket—play a crucial role in sustainability efforts. With their power of the purse, they can demand that suppliers provide products that require less energy (both in their manufacture and their use), are produced from renewable sources, and are more environmentally friendly. Wal-Mart Stores, for example,

SINCE THE 1950s, America's use of oil has almost tripled and 69% is now used by the transport sector.





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is partnering with the Carbon Disclosure Project (CDP) to measure the amount of energy used and carbon emitted throughout the supply chain of certain product categories, including milk and DVDs. The company will use this information to help suppliers find ways to be more energy-efficient.

When manufacturers and retailers get their suppliers to move on sustainability, it isn't just good for the planet; it's good for business. It lets companies show their customers that the products they buy are produced in responsible, sustainable ways. Companies don't need to have the leverage of a Wal-Mart to drive sustainability through their supply chain, either. A growing number of organizations, like the CDP, are there to give them a hand.

The Sustainable Forestry Initiative is best known for a rigorous set of requirements that ensures an SFI-certified forest is well-managed—a place where trees are replanted, biodiversity is protected, and water and air quality are cared for responsibly. Following the SFI standard is no small undertaking. It means making sure that ecologically, geologically, and culturally significant sites in a forest are managed for their continued existence; letting independent auditors verify as such; and investing money to research forest management systems (to date, SFI participants have invested more than \$880 million). For producers and buyers concerned with sustainability, SFI provides more than a label; it provides assurance.

Yet with only 10% of the world's forests following any recognized sustainability standard, even manufacturers that use SFI-certified products don't always use them exclusively. So SFI has developed a chain-of-custody certification, which enables companies to claim, via a label, that the end product it makes—i.e., lumber or paper—contains a certain percentage of SFI-certified content. Third-party audits verify that the program's participants have the tracking systems in place to accurately measure the certified content. "Companies are realizing that they have to bring sustainability into the

supply chain," says Kathy Abusow, SFI's president and CEO. "In 2007 alone, our chain-of-custody program has grown more than 90%, with more than 320 facilities now participating."

RULE NO. 4. | *Develop technologies that support sustainability efforts.*

If there is one universal truth in business it is this: Where there is demand, there is a market. Companies are looking to create energy-efficient, sustainable processes and products, and they're looking to technologies that can help them do it. The innovators that offer these tools will find that products that enhance sustainability efforts can also enhance their bottom line.

One area where technology is playing a key role in fostering sustainability is in a new generation of computer-aided design, or CAD, software. For a long time, CAD systems—which help architects and engineers design buildings—were of limited use in designing environmentally friendly, or "green" structures. "The software would basically let you draw on the computer, which was good for seeing what a design would look like, but not useful for doing any sort of analysis on it," says Jay Bhatt, senior vice president for architecture, engineering, and construction solutions at Autodesk Inc., the world leader for 2D and 3D design software. "If you wanted to see how changes to lighting, heating, and power systems would impact the energy use of your design, you'd have to print out blueprints, overnight them to engineers who could do the calculations, and wait for the results



to come back. Or you would do changes on site, after ground was broken, which is always an expensive and cumbersome process."

Complicating the picture is the vast number of structures that will need to be constructed over the next quarter-century. "Countries like China and India are building entire cities from scratch," says Bhatt. "Fifty percent of the buildings that will exist in 2030 haven't even been

ACCORDING TO a Hill & Knowlton survey, three-quarters of execs think companies need to create a Chief Energy Officer position. ►



Ignacio Cruz, Enrique Soria and Francisco Martín,
CIEMAT Wind Energy Unit Team.

saturday night in the testing plant

Spain is a country that enjoys high standards of well-being and quality of life. It is a reflection of a first-rate level of socio-economic development. Spanish businesses are very aware of environmental and sustainability issues and are also outstanding in their achievements in technological research and development.

Spain currently has the second largest installed wind power capacity in the world (*), and is one of the most advanced countries in the renewable energy sector.

Spain is the world's second largest producer of windpower.*

(*) Source: EWEA (European Wind Energy Association). Data: 2005



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built yet." Designing that kind of volume, in a way where systems could be constantly tweaked to find the most energy-efficient, environmentally friendly solutions, would require a whole new level of CAD.

Autodesk's solution is a process known as building information modeling, or BIM, which it has incorporated into its Revit platform of software solutions. Revit allows architects and engineers to incorporate data into their computer-based designs—everything from spatial relationships to information about individual building components. "BIM's great benefit is that you've now got all of this data about your design, and it's connected and linked, so you can do analysis on it," says Bhatt. "You can see how using different heating or air-conditioning systems impacts your energy use and greenhouse gas emissions. And you can do it quickly, because you're no longer working with a drawing on the screen or a physical structure. You're working with data. You can model everything on the computer, trying different green scenarios, until you find the optimal solution."

The promise of Revit—which was used in designing the Freedom Tower in New York, among other projects—is its ability to take sustainable building design from a novelty to a given. "If we're going to be able to do more than just a one-off green building—to do sustainability in volume—BIM is essential," says Bhatt. "We're making it

happen, and in the process, it's been very good business, both for the building industry, and for Autodesk."

RULE NO. 5. | *Make environmental stewardship easy for all your stakeholders.*

No matter how impressive the technology, or well-meaning the effort, sustainability initiatives won't succeed if the people they rely on—whether they be employees, suppliers, or consumers—don't embrace them. New products and processes may look great on paper, but if they're too expensive or burdensome, they're not going to take.

Consider the case of recycling. The technology to take all of those bottles, cans, newspapers, and boxes and recycle them has been readily available for years. But in cities across America, recycling rates weren't nearly as high as many hoped. To put it bluntly, recycling was a hassle.

"It takes a conscious effort to recycle, and it's not always easy," says David Steiner, CEO of Waste Management, the leading provider of waste and environmental services in North America—and the continent's largest recycler. "You have to walk an item outside, place it in one of two or three recycling bins, and then drag the bins to the curb every week. Many more people would recycle if it were easier to do."

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To simplify the process, Waste Management was an early adopter and champion of the concept of single-stream recycling, in which all recyclable material can be put in a single bin. The content is then picked up and taken to one of Waste Management's 30 single-stream facilities located across the U.S. and Canada. There, all of the material is placed on a conveyor belt, and an assortment of screening and sorting technologies separate the various types of recyclables. Glass, for example, can be shaken off the conveyor because it's heavy. Air jets are used to blow light paper upward, while rollers flip cardboard off in another direction. An eddy current induces a magnetic field in aluminum cans, allowing them to be separated, and an electromagnet pulls the metal from the line. In some locations, optical sorters differentiate different kinds and colors of plastic.



The result: In areas where single-stream recycling has been launched, recycling rates have increased by up to 30%. "The volume of material processed in our

single-stream facilities has more than doubled in four years' time," says Steiner. It's not a money-losing operation, either: Waste Management expects returns on single-stream recycling to be about the same as its returns on solid waste.

And perhaps that's the most important driver of all: Sustainability pays off. It can help us solve our energy and environmental challenges. It can boost our nation's competitiveness. It can open the

door to new opportunities and markets. Not long ago, companies had to be prodded into taking even the smallest steps toward sustainability. It was a do-good notion that took time and resources away from the business. Now they know better. Yes, the green movement is all about doing good. The beauty is, it does good for everyone.

—Alan Cohen

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It takes a trip through an airport—or the access roads leading to one—to know that air travel is a growth industry. Indeed, between now and 2025, passenger aircraft traffic is expected to increase by 4.8% per year. And to meet that demand,

some 23,000 new jets, of 100 seats or more each, will be needed. Those numbers could mean huge consequences for the environment, but innovations at one of the world's leading aircraft companies, Airbus, aim to ensure a green future for air travel.

Aircraft, of course, impact not only the environment but the passengers who fly them and the companies that operate them. So the challenge is to design jets so that everyone wins—creating models that are fuel-efficient, emissions-friendly, comfortable, and cost-effective. With its groundbreaking new aircraft, the A380, Airbus shows that these goals can go hand in hand.

The Airbus A380—the most technically advanced civil aircraft in operation—sets new standards for environmental performance. By building roughly 25% of the A380 out of lightweight carbon fiber composite materials (more than on any other commercial jet today), Airbus was able to decrease the weight of the aircraft. Lower weight means less fuel is required, which means fewer emissions. In fact, the A380's fuel consumption

of 2.9 liters per passenger per 100 kilometers is equivalent to that of a small car. "The A380 is the world's most fuel-efficient aircraft," says Justin Dubon, regional press manager at Airbus. "Today's fleet consumes, on average, 5.5 liters per passenger per 100 kilometers. The A380's fuel efficiency is 20 years ahead."

By saving fuel, the A380 isn't just good for the environment, but also good for the airlines that fly it, cutting their energy costs. "In these times of high fuel prices, eco-efficient aircraft just make good business sense," says Dubon. "Our customers demand aircraft that offer better fuel economics." And the A380's capacity—up to 525 passengers in a three-class configuration—allows more passengers to be transported with fewer flights, helping relieve airport congestion. The aircraft's quietness and low emission performance does make it an "excellent neighbor," addressing local environmental concerns. Airbus's next aircraft to enter production, the A350XWB, will bring even bigger gains in environmental and economic performance.

Yet it's not just planes in the skies that have an environmental impact. Jets that have reached the end of their life need to be dismantled, and this hasn't always been done in the greenest of ways. With 4,000 aircraft due to be retired by 2023, those ways need to change. Airbus is tackling the challenge on two fronts. First, as a partner in the Process for Advanced Management of End-of-Life Aircraft (PAMELA) project, it's helping to



develop innovative, environmentally responsible solutions for decommissioning and dismantling aircraft, as well as techniques to raise the level of recyclable and reusable content. PAMELA expects to demonstrate that up to 95% of an aircraft can be recovered and kept out of landfills.

But Airbus is taking an even bigger step: Through the use of a pioneering Environmental Management System, it is able to factor the environment into all stages of an aircraft's lifespan. So before decisions are made at the design phase, potential consequences down the road are assessed and minimized. "Airbus's green strategy is woven as an integral part of its business—from product design, to manufacturing, to operations and aircraft recycling," says Dubon. "Innovations like these will enable the aviation industry to grow—while having less and less impact on the environment."

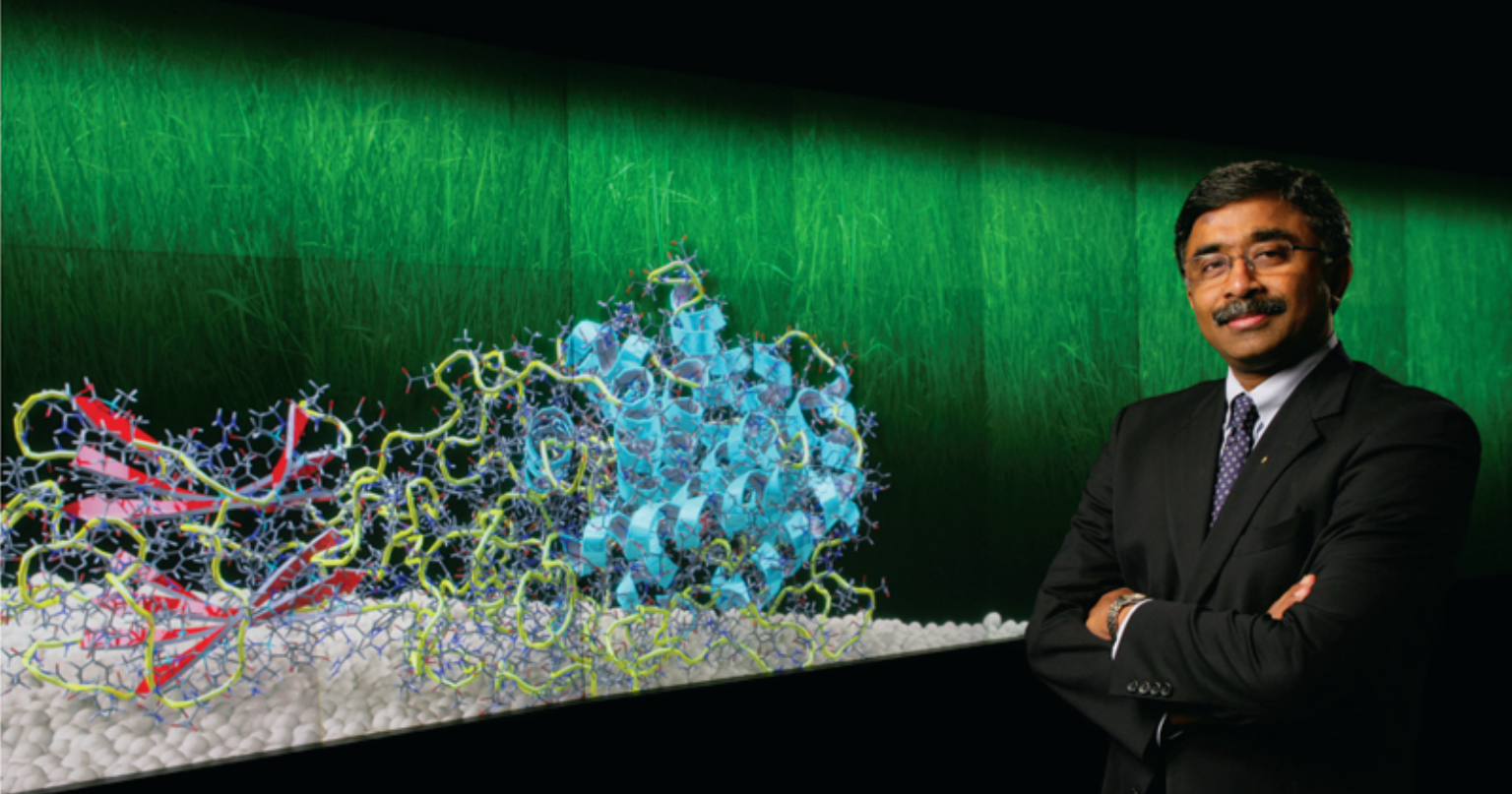
ECONOMISTS say that a \$60 increase in oil prices—from \$60 to \$120 a barrel—would impose an extra \$210 billion cost on households. ➤



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The World Goes Green

Other nations have gotten a jump on the U.S., but we're not out of gas yet.



Last year, the United States invested \$16.4 billion in sustainable energy. The country produced 140 megawatts of electricity through solar power, and more than 44.5% of the world's ethanol supply. The figures are impressive, but other nations have done better. The European

Union plowed \$23.1 billion into renewable sources of energy; Germany's solar-power initiatives were seven times ours. Brazil now rivals the U.S. in ethanol production—and because the sugarcane they use is cheaper than the corn we rely on, Brazil's ethanol costs less to make. But here's the real eye-opener: The EU's capacity to produce clean, renewable power is three times that of the U.S.

To be fair, other nations have gotten a head start. Their governments have designed incentives to get renewable power off the ground and on the grid, and it's working. China has seen a sevenfold increase in wind power since 2000, and is expected to be the world leader by 2020. Japan, through a ten-year subsidy program, has been able to cut the price of residential solar systems by more than half—and get them into a quarter of a million homes.

And then there is Spain. Already the second-leading producer of wind power in Europe (after Germany), it is moving heavily into solar, a natural evolution for a nation with more available sunlight than any other country on the continent. Spain's goal: to get 12% of its energy from renewable sources by 2010, up from 6.5% today. "Like the U.S., we're very dependent on foreign oil, so we started thinking about local sources of energy, like the sun," says Enrique Alejo, trade commissioner at the Trade Commission of Spain. "To help develop and support them, we took a legislative approach."

A CATALYST FOR CHANGE


In 2004, the Spanish government approved incentives known as feed-in tariffs, which, in other parts of Europe, have proved a successful way to promote renewable energy. The tariff guarantees producers a specific rate, over a long term (in Spain, 25 years), for their energy. "It takes away the uncertainty for companies wishing to enter the market," says Alejo. "They know that they'll be paid a set amount of money for producing solar energy." The idea behind feed-in tariffs is to make renewable energy projects profitable, where they may not otherwise be, thus encouraging new players to enter the market. (The tariff, paid by the utility company that purchases the energy, is spread among the utility's customers, who typically see a small increase in their bills.)

Spain's incentive program has sparked a boom in photovoltaic, or PV, installations: solar cells that convert sunlight directly into electricity. Many PV solar plants are coming online or are under construction throughout the country, and the installed capacity in Spain is about to surpass 400 megawatts, the original target for 2010.

There have been technological breakthroughs, as well. In March, the world's first commercial concentrating solar power plant was launched near Seville, in southern Spain. The plant, known as PS10, features a nearly 400-foot tower surrounded by 624 large mirrors. These reflect sunlight to the top of the tower, where a solar receiver converts the sun's rays to steam, which drives a turbine to produce electricity. The plant currently outputs 10 megawatts of power, but when completed in three years it will generate 300 megawatts—energy for around 180,000 homes, equivalent to the needs of the city of Seville.

In the U.S., there has been no big push behind a single form—or even a few forms—of energy, but that's not necessarily a bad thing. Putting all our eggs in one basket can be risky. Besides, even with the potential renewables we have, decades from now they'll likely provide just a portion of the energy we'll need. The better solution: Develop multiple sources—and improve the ones we already rely on, like coal. The idea is not to turn our backs on fossil fuels, but to make them more efficient, while reducing their impact on the environment.

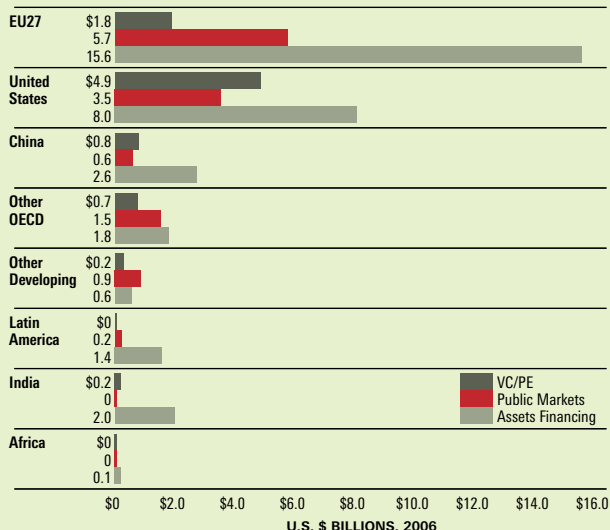
"Coal is simply too important from availability, supply, and cost standpoints for us not to tackle the environmental challenges in an intelligent manner," says

A NEW Ernst & Young Index has deemed the U.S. the most attractive place to invest in renewable energy in 2007. 



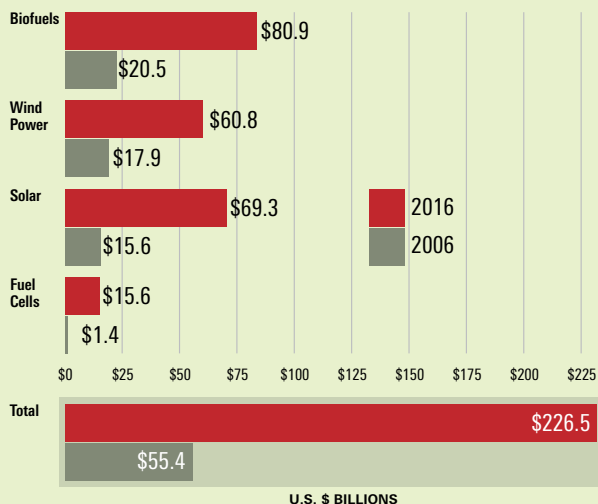
Saving the Planet

The E.U. leads the world in total sustainable energy investment.



Source: Council on Competitiveness, New Energy Finance, and Sustainable Energy Finance Initiative

The global clean energy market is set to quadruple in the next decade.



Source: Council on Competitiveness, Clean Edge, Inc.

Jim Owens, chairman and chief executive officer of Caterpillar Inc. "Coal provides 50% of U.S. electricity, and will continue to play a vital role in our future energy needs." Incentives that convert older, less efficient coal-fired plants to newer, more efficient technology are a good first step.

LOOKING FOR INDUSTRY ALTERNATIVES

Likewise, oil and natural gas companies in the U.S. are investing in new technologies—both to improve fossil fuel efficiency and production, and to develop alternative fuels. "We're going to need everything," says Kyle Isakower, director of policy analysis at API, the national trade association for America's oil and natural gas industry. "Even if you assume significant growth in renewables, oil, coal, and natural gas are going to maintain the same market share they have today in order to meet growing energy demand. It's important for us to grow alternative energy industries, but also emerging hydrocarbon technologies—like oil shale and oil sands."

Indeed, between 2000 and 2005, 73% of all investment in emerging energy technologies came from the oil and gas industry, including \$12 billion for research not related to fossil fuels, like electric drivetrains and biofuels. "We see ourselves not simply as oil and gas companies, but as energy companies," says Isakower. "We think it's important to diversify."

At the same time, work is underway on the environmental front, with the production of ultra-low-sulfur diesel fuels that reduce emissions, and improved energy efficiency at the refineries themselves. Utilizing technologies like combined heat and power—which uses a single process to create both heat and electricity at a manufacturing facility—has reduced energy use significantly. "In 2006 alone, refiners saved the energy equivalent of taking 525,000 cars off the road," says Isakower.

Of course, at the end of the day we're going to need the personnel to support all of these energy resources. And if we don't start focusing on that, we might have a problem. "In the next ten years we're going to lose half of the country's 412,000 electric power workers to retirement," says Michael Langford, national president of the Utility Workers Union of America, AFL-CIO. "Nuclear plant operators, coal plant operators—these are highly skilled jobs, and you need about four years to get them to the top of their game." If we're not careful, a skilled workforce may be the one natural resource we'll find in surprisingly and troublingly low supply.

—A.C.

THE GLOBAL carbon market, sized at \$30 billion by the World Bank last year, is expected to reach \$100 billion by 2010.





Council on Competitiveness

Energy Security, Innovation and Sustainability Initiative



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About the Council on Competitiveness

The Council's mission is to set an action agenda to drive U.S. competitiveness, productivity and leadership in world markets to raise the standard of living of all Americans.

The Council on Competitiveness is the only group of corporate CEOs, university presidents and labor leaders committed to ensuring the future prosperity of all Americans and enhanced U.S. competitiveness in the global economy through the creation of high-value economic activity in the United States.

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