

## China's Green Innovation

*BusinessWeek recognizes 10 companies for outstanding efforts to transform China's environment*

Growth is China's lifeblood. In the span of a generation, this nation has become the world's factory. Hundreds of millions of peasants have moved from farm to city, from poverty to relative prosperity. To house this new industrial class, scores of mega-cities have sprung up virtually overnight. After two decades of double-digit economic growth, China is on track to become the world's largest economy within a decade.

But all this growth has come at a terrible price. Unbounded industrialization has made two-thirds of China's rivers and lakes too toxic for industrial use, let alone agriculture or drinking. Just one in 100 of China's 560 million city dwellers breathes air considered safe by European standards. And with arable land in severe shortage, poisoned floodwaters have ruined productive fields. While its economy hurtles forward, China's environment has taken a "great leap backwards," says New York-based China expert Elizabeth Economy, author of *The River Runs Black: The Environmental Challenges to China's Future*. The shadow of China's eco-troubles stretches overseas, as well. Last year, ahead of most forecasts, China passed the U.S. to become the world's largest source of greenhouse gases.

Given its environmental troubles, China may seem an unlikely incubator for solutions. Yet a BusinessWeek survey of green companies in China has found that dire need is spawning rapid innovation. And maybe that's not so surprising. After all, no other country is spending as much to build industries, infrastructure, and cities as China. And no country more urgently needs to repair its environment. In cleantech, "China is a very fast follower," said Alex Westlake, director of ClearWorld Now, a green-oriented investment group, at a recent investor summit in Beijing. From smart meters to e-cars, "China's contribution to [addressing] climate change is that it will make most of the cleantech equipment," he predicts.

Evidence of China's prodigious range of green business activities emerged from a panel of 11 environmental experts convened by BusinessWeek earlier this year. The group was asked to nominate companies for their outstanding efforts in transforming China's environment. From a pool of more than 60 nominations, the panel chose five Chinese companies and five multinationals as recipients of the first BusinessWeek Greener China Business Awards. To pick the winners, the judges—a mix of Chinese and U.S. academics, officials, and environmental advocates—examined the candidates' track records, identifying those making a verifiable, positive improvement to China's environment. Independent experts also vetted the short-list of finalists.

The winners include some companies already well known for selling systems that generate clean energy, such as Suntech, with its solar panels. Other winners, such as Dupont, 3M, and GE, impose industry-leading environmental standards on their Chinese factories and their parts suppliers, while providing advanced technology and eco-friendly products to customers. BYD is a leader in the global race to build affordable electric cars, while Haier is pioneering a new generation of energy efficient appliances. Wal-Mart was chosen not only for its own in-house green practices but for challenging suppliers, customers, and even competitors to reduce their impact on China's environment. These aren't simply green practices, says Wu Changhua, Greater China director of the Climate Group, and a judge for BW's award, "They're best practices."

### **Enthusiastic Green Investment**

China's green awakening comes not a minute too soon. The World Bank estimates that damage from pollution—everything from dead fisheries to premature human death—saps nearly 6% of China's gross domestic product each year. As concern grew about the deteriorating environment, the government began introducing energy and pollution-reducing measures earlier this decade: Dozens of targets were included in the 2006-2010 Five Year Plan. Now with economic growth decelerating, Beijing is speeding up efforts to eliminate waste and create the foundations for a greener economy. China aims to boost its share of electricity created from renewable sources to 23% by 2020 from 16% today, on par with similar targets in Europe. (The U.S. has no such national goal.) By the end of next year, China's aim is to produce each unit of economic output using 20% less energy and 30% less water than in 2005. "No other country has committed to achieve this much within this short time frame," says Hu Tao, Coordinator of the UN-China Climate Change Partnership Framework Program in Beijing and a judge for BW's award.

Encouraged by these signals, local and foreign investors are piling in. According to a study by REN21 of France, an international non-profit green advocacy, clean investment in China totaled \$12 billion in 2007 (the most recent year for which comparative data is available). That is second only to Germany's tally, and China is on track to take the top spot this year. Data from Cleantech Group indicates that, in 2008, investment in domestic green company development (including risk investment, mergers and acquisitions and initial public offerings) increased by 11%, reaching \$2.9 billion.

The result is a growing list of green superlatives. Led by Suntech, China is the world's largest exporter of solar panels. In wind turbines, Chinese exports are expected to lead the world next year, says the Climate Group. At home, China installed more new wind turbines than any other country except the U.S. in 2008.

Even in the market for conventional power plants—the sort that convert natural

gas or coal into electricity—China is now building some of the most sophisticated facilities, says David Victor, director of the Program on Energy and Sustainable Development at Stanford University and one of BW's judges. Not all new plants are up to this high standard. But GE's most advanced natural gas turbine is its best selling model in China, even though the last generation is available, cheaper, and still selling well in the West.

Of course, even go-go China isn't immune to the global recession. Chinese makers of solar photovoltaics export 98% of their production, leaving players such as Suntech vulnerable. The Wuxi-based company has been battered by a collapse in demand from its top markets: Germany, Spain, and Japan. Factories are running at half of last year's capacity. In March, the Finance Ministry unveiled subsidies to spark solar demand among China's builders. The sweetener: CNY20 per watt of capacity installed in 2009, enough to cover up to 60% of estimated costs to install a rooftop system. Meanwhile, weakening returns on investments in new renewable energy projects recently led Royal Dutch Shell to declare a moratorium on new investments in solar and wind projects. But the company continues to invest in biofuels, and runs China's most efficient petrochemical plant.

### **Domestic Demand Pulling up the Green Industry**

Ultimately, a low "China price" for sustainable technologies will help China's green companies stoke domestic demand. In March, Premier Wen Jiabao declared an intention to reduce the economy's dependence on exports by promoting domestic consumption.

Himin is already prospering at home (page TK). The Dezhou-based company makes solar water heaters in huge volumes—some 2 million square meters worth each year, equal to twice all such sales in the U.S. Because its water heaters sell for as little as CNY1,500, they have become standard in new housing and many commercial buildings across the country.

The need to lower energy use in China's buildings cannot be overstated. China is in the midst of the biggest building boom in the planet's history. Analysts estimate that some 400 million people—more than all the people of the U.S. and Canada—will move from the country into cities between 2000 and 2030. As a result, roughly half of all the buildings erected worldwide over that period will be built in China.

The question is whether China will put up new buildings that conserve energy, or use power wastefully. A typical Chinese structure uses twice or more the energy to heat or cool itself than better-insulated buildings in the U.S. or Europe. What's more, when newly urban Chinese fill their homes with TVs and appliances, their electricity use triples.

Broad Air Conditioning is helping to change that. By using waste heat or fuel (such as natural gas) instead of electricity to drive compressors, Broad's air conditioners can deliver two to three times more cooling per unit of energy than a conventional chiller. Haier, meanwhile, has combined low-cost manufacturing and advanced technology to make energy-sipping washing machines and refrigerators a reality for China's fast growing class of home-owners.

**Uneven Path to Revolution**

As China forges ahead, contradictions between pro-growth policies and green goals are sure to multiply. For now, China faces a challenge merely implementing existing green rules. It's common to hear industry executives call China's environmental regulations top notch, but complain that they lack details. Without key information on enforcement, "many terms [in the current Renewable Energy Law] are simply meaningless," says Huang Ming, founder and chairman of Himin. There is some progress. In May last year, China passed new regulations forcing companies to divulge more information about their toxic emissions. These have made it easier for watchdog groups and the press to discover violators, says Zhou Weidong, China Director at Business for Social Responsibility in Guangzhou, and a BW judge. But some companies ignore the rules. "Paying penalties is cheaper than complying with the law in many areas," adds Zhou. "That's a problem."

Green goals are not guided solely by policy imperative or investment returns. There is a natural competitive spirit at work in the environmental arena, prominently displayed at the 2008 Olympics. The games were a tour de force in green technology, and a showcase for Broad, Haier, and other domestic players. Foreign companies such as GE also brought their greenest products to the games. "Domestic companies are still in the learning stage. They may not feel a pressing need to go green," says Guo Peiyuan, co-founder of SynTao, a corporate social responsibility consultant. But once they start to compete with the world's best brands, they have no choice but to improve, he adds. The race to get greener will have many winners.

**List of Awardees of 2009 Business Week Greener China Business Award**

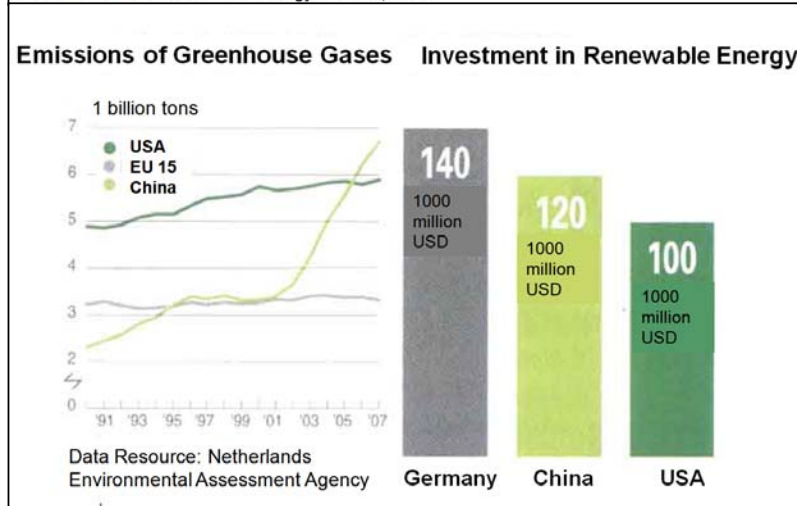
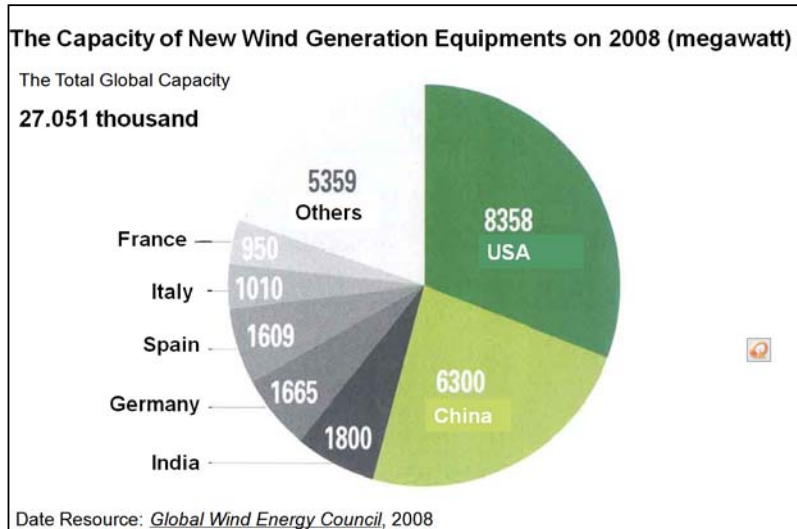
	Company	Reasons for Winning
Chinese Companies	Broad Air Conditioning	The central air conditioning equipment of Broad Air Conditioning does not use electric power; rather, it generates cooling air through natural gas combustion or by making use of the waste heat of other heavy machinery equipment
	BYD Co., Ltd.	Leading China's green automobile research and manufacturing, BYD has launched its hybrid cars and pure electric automobiles, challenging GE and Toyota

	Haier	With Chinese families getting richer by the day, household appliance consumption is continually increasing. As such, Haier is making efforts to “popularize” energy conservation and environmental protection technologies
	Hi-min Solar Energy Group Co., Ltd.	The solar energy water heater manufactured by Hi-min Group has already become the standard configuration of hundreds of thousands of households in China
	Suntech Power Co.,Ltd.	As the world’s largest solar energy battery plate manufacturer, Suntech Power Co., Ltd. is reducing the clean electric power costs for domestic and overseas users
Foreign Companies	3M	From light-reflecting paints for signs to heat-insulation glass film, 3M sells tens of thousands of energy conservation and environmental protection products in China
	Dupont	Dupont provides China’s rapidly increasing solar energy and wind power companies with high-grade raw materials, and ensures that its own factories in China abide by the uniformly strict environmental protection standards of the mother company
	GE	Whether clean locomotives, high-energy efficiency thermal power equipment, or low-cost wind power turbines, GE is helping China realize environmental protection while ensuring high-speed growth
	SHELL	The petrochemical JV project of Shell - the world’s second largest listed oil company, and CNOOC, is one of the petrochemical plants with the lowest pollution and the highest resource efficiency in the world
	Wal-Mart	The world’s largest retailer has set strict environmental standards, and is changing the mode of business operation of thousands of Chinese suppliers

### Methods of Award Appraisal

Based on the implementation and promotion of environmentally responsible behavior of companies in China, members of an expert committee and the editors and reporters of Business Week, nominated more than 60 Chinese companies and multinational corporations. From these candidates, our expert appraisal committee ranked the companies that they thought deserving, according to certain standards helping to judge companies’ performance in terms of bringing about the most outstanding improvements in China’s environment. Winners of the present award include companies that produce and distribute green technologies, and there are also companies that achieve clean business operation through energy conservation and emissions reduction. We also invited independent

third-party experts to examine and verify the list of winners, including Ma Jun, director of the Institute of Public & Environment Affairs of Beijing.



### Fuel Consumption of Vehicles

The criterion is stricter in China than in the US, but both in China and the US should be lower than it is in Japan and Europe.

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The equivalent mileages per gal. of gasolene

USA	<b>30.2*</b>
China	<b>35.8</b>
Japan	<b>42.6</b>
Europe	<b>43.3</b>

Data Resource: China Forum of Environmental Journalists      \* Goal in 2011

## GE: CHINA'S GREEN PIONEER

Steve Fludder arrived in Beijing in 2003 as the newly appointed head of GE Energy China. From the start, he had a hunch China's appetite for green technology was about to take off. Back then, China's factories had a reputation for being fast, sloppy, and anything but energy-efficient. In environmental circles in Europe and America, "the prevailing thought on whether China would go for green tech was 'You gotta be kidding me.'"

Fludder's instinct was right, however. Later in 2003, China opened up bidding for its first commercial wind farm. The scale was small, just 10 turbines, and there were no special tax credits or incentives. "If it weren't for World Bank financing, the project never would have happened," he says. Yet, anemic as the returns looked, Fludder kept up the chase. GE won the bid and, using imported turbines, completed the 15 mw project in 2005.

Just four years later, China is the world's second fastest-growing market for new turbines, right behind the U.S. And while the world's top windmill makers are clamoring for a share, GE's early entry helped put it on top. The company has installed some 400 turbines in China—in Jiangsu, Shanghai, Hebei, Xin Jiang and Inner Mongolia—with about 200 more under contract.

From early on, GE worked to share production between its in-house factory and local suppliers. From simple parts such as steel towers, to complex components such as turbine blades and gear boxes, GE cultivated local suppliers wherever possible. And the company followed Beijing's cues on where to set up, settling in the industrial northeast because the government wanted to seed green jobs and investment in this rust-belt region. "It was a risk. This cost us money to develop capacity," says Fludder, now vice-president of GE Ecomagination, the companywide initiative in sustainable technology. "But we wanted to prove we were committed. That meant sharing technology, too." Ecomagination is an innovation strategy that GE has introduced for sustainable technologies.

Wind power is just one domain in which GE has shared technology with joint-venture partners and built up a thriving green business in China. From efficient train engines to water filtration technology and advanced power plants, China has become a voracious consumer of GE's green products. Sales of goods with the Ecomagination tag—typically given to the most energy-efficient products in each category—make up about 9% of total sales globally. Yet in China, Ecomagination sales accounted for 17% of GE's \$4.6 billion total last year.

Working with local partners, the company brought its most sophisticated gas-turbine generators to China for the Beijing Olympics in 2008. At the Beijing

Taiyanggong power plant, waste heat from the combustion process is recycled, resulting in around 80% efficiency, more than double the rate of most conventional power plants in the U.S. The bulk of GE's turbine sales in China are of the ultra-efficient model. "Given that China is short of energy," says Fludder, "it makes no sense to pick last-generation technology that wastes energy."

GE also is cultivating a fresh supply of green managers, at least some of whom will inevitably be hired by competitors. Working with the Institute for Sustainable Communities (ISC), a U.S. nonprofit, GE co-founded the Environment, Health, and Safety Academy at Lingnan College of management at Sun Yat-sen University in Guangdong last fall. The academy, the first of its kind in China, has adapted and translated environmental operations manuals donated by a growing list of Western companies. The 11-course program focuses on clean production technology, how to assess the cause of wasteful processes, and how to manage organizational change.

This fall a staff of eight experts will begin to train the first batch of Chinese eco-managers, explains George Hamilton, ISC's president. Managers with better skills "won't solve all of China's environmental problems," Hamilton says. "But the more that are out there able to do this, the faster things will improve."