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Special Advertising Sections

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Special Advertising Section

Investing in America's Energy Future



Jigar Shah, CEO of Sun Edison LLC, represents the kind of entrepreneurial innovation that will hasten our transition to an energy future beyond fossil fuels. Behind Shah: solar panels, manufactured by BP, that SunEdison has installed at Whole Foods Market Inc., an organic and natural supermarket, in Edgewater, N.J.

Renewable Energy is Off and Running

History is on the side of renewable energy. According to the U.S. Department of Energy's Office of Renewable Energy and Energy Efficiency, many early civilizations used the sun, water, wind, and even geothermal energy to meet basic needs. North American Indians used hot springs for cooking as far back as 10,000 years ago, the ancient Greeks used hydro power to grind flour, and the Persians used windmills to pump water in the first millennium.

Harnessing the power of ocean waves is hardly a 21st-century brainstorm. Jigar Shah has placed his bet on solar power. The 31-year-old entrepreneur is the CEO of Sun Edison LLC, a young Baltimore company that finances and installs solar projects. With high-profile customers like Whole Foods and Staples, and equally high-profile investors like Goldman Sachs and Hudson United Bank, small players like SunEdison are riding the wave of interest in renewable energy, while major industry movers like BP are helping generate the wave.

Many investors, utilities, and businesses see renewable energy — of some kind — as the next big thing. Follow the money: hedge funds, venture capital, and merger activity have gravitated to many varieties of renewable energy, from solar power to wind, geothermal, and biofuels. Shares in renewable energy companies have far outpaced the broad market indexes. Solar power stocks gained an average of more than 110% last year and are way ahead of the market so far in 2006. Biofuel and biomass stocks are also recent market-beaters. Economists see promising job creation, as well, from this growing sector.

More Than A Pleasant Zephyr

Some would call wind power the granddaddy of renewable fuels. In the current millennium, great gains in wind power viability have derived from the evolution of the wind turbine. Because of lighter, stronger materials and better design, turbine blades, always large, are now truly enormous — as long as a football field for the most powerful turbines, with longer yet to come. The thinner, slower blades have scored huge improvements in output, as well as bird safety.

Wind power, at \$11.8 billion in global revenue, is being taken seriously by some large, sophisticated companies, including GE, Siemens, Mitsubishi, BP, Florida Power & Light (FPL), and Goldman Sachs. Indeed, BP has made wind one of the four pillars of its \$8 billion, 10-year commitment to building an alternative energy business — a business inspired by the fact that, according



to the IEA, the power sector releases twice as much carbon dioxide globally as the transport sector. "We plan to grow our wind business from 30MW to more than 450MW in 2008, becoming a top tier wind power operator by 2015," says Steve Westwell, group vice president for BP Alternative Energy.

Wind turbines have come a long way since the days of Don Quixote.

A Letter from Samuel W. Bodman, Secretary of Energy

Our transitioning energy economy has important implications from Main Street to Wall Street. Because renewable energy technologies bring new opportunities, businesses large and small can benefit from investing in the renewable energy sector — one which creates jobs, enhances national security and protects the environment.

As part of the Bush Administration's ongoing effort to increase energy and economic security, President Bush recently announced his Advanced Energy Initiative, which provides a 22% increase in clean-energy research and aims to significantly reduce America's reliance on imported fossil fuels, particularly from areas of the world that are less stable than we would like. As part of this initiative, we're focused on the Hydrogen Fuel, Biofuels and Solar America Initiatives — all of which will help change the way we power our cars, homes and businesses.

Gradually, work with our private-sector partners has already begun to enter the marketplace: we are working to make hydrogen-powered cars a commercially viable option; recent breakthroughs in ethanol and bio-based products represent a promising alternative to fossil fuels; and solar cells are more efficient than ever. Such developments will not only increase energy security, but will generate more jobs, strengthening our economy.

I thank BusinessWeek for producing this landmark section, bringing attention to the important activity occurring at the Department of Energy.

Sincerely,

Samuel W. Bodman
Secretary of Energy



Feel the low carbon electricity in the air?



The power sector is the largest single source of carbon dioxide emissions. And as demand grows so will emissions. But there is an alternative: BP Alternative Energy. Recently we announced plans to invest up to \$8 billion over the next 10 years to provide low carbon electricity. We estimate it will eliminate CO₂ emissions by 24 million metric tons a year by 2015.



BP Alternative Energy Leads the Way

In a world with an almost insatiable demand for power, it takes innovative thinking to create alternative energy sources that also significantly reduce carbon dioxide (CO₂) emissions. The power sector accounts for more than 40% of man-made greenhouse gas emissions – almost double the amount of the transport sector – and is the largest single source of CO₂ in the environment. While the rise in power demand is positive in that it reflects growing economies, the growth demand for electricity will only increase emissions. As a result, any material improvement in reducing CO₂ emissions will require development of alternative energy options for power generation.

BP, a global energy group with a long-standing commitment to environmental responsibility, recognizes the need to develop and provide new, cleaner approaches to meeting the growing need for power around the world. To bring greater emphasis and focus to all of its low-carbon power businesses, the company recently launched a new division: BP Alternative Energy.

BP Alternative Energy aims to invest \$8 billion over the next 10 years to build on and expand its portfolio of low carbon and renewable energy, including solar, wind, hydrogen power, and natural gas-fired power generation.

BP was the first company to commercialize multi-crystalline solar technology more than 30 years ago. Today it is a leading manufacturer and supplier of photovoltaic systems. The company also owns and operates wind farms, and has an established

presence in the natural gas-fired power market. BP is also leading the way in developing industrial scale hydrogen power stations.

“Now is the right time to invest in alternative energy sources,” says Steve Westwell, group vice president for BP Alternative Energy. “The low-carbon power sector is reaching a critical inflection point. Consumers are increasingly engaged in environ-



BP plans to more than double its solar panel production by the end of this year.

mental issues and many countries are concerned about energy security. The demand for cleaner electricity is growing. Taking low-carbon power alternatives to scale is the appropriate next step.”

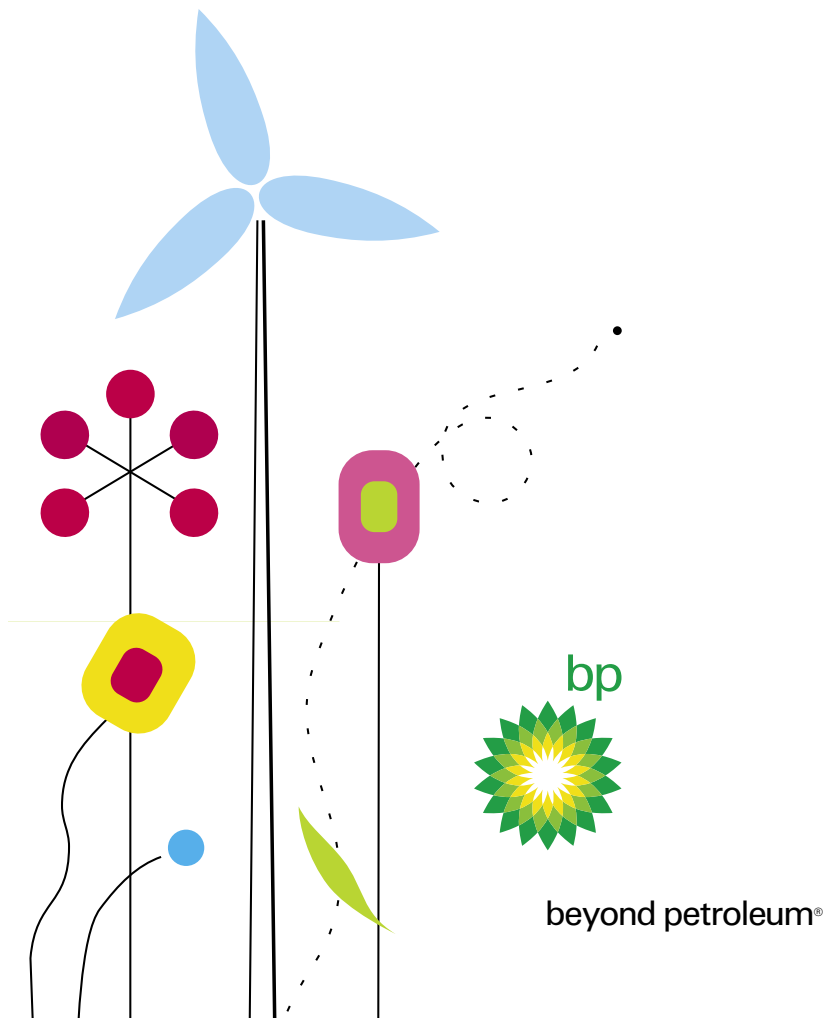
BP Alternative Energy’s approach makes good business sense. Maturing technologies are creating significant opportunities to create a profitable, high-growth, global business over the next decade. In fact, the company’s goal for new business is to become a world-leading low-carbon power developer by 2015.

“We have the potential to avoid or eliminate 24 million tons of CO₂ per annum by 2015,” adds Westwell. “That’s like making a city the size of Chicago virtually carbon-free. Clearly alternative energy is not just good business, it’s a responsible environmental practice, too. As a leading innovator, we are determined to pave the way toward a cleaner environment and reliable power generation.”

We’re harnessing
the power of solar,
wind, hydrogen
and natural gas.

alternativenergy™
Powered by BP

BP Alternative Energy will use a mix of technologies to provide low and carbon free electricity. Recently, we completed the expansion of our solar manufacturing facility in Maryland, more than doubling its capacity. We also announced plans to build a first of its kind hydrogen fueled power plant in California. When completed it will generate electricity while capturing 90% of the carbon from the plant. Visit bpalternativenergy.com



Today, though wind is one of the lowest-cost renewable energy sources, modest subsidies remain necessary, a usually controversial government action that has found broad consensus in this case in order to provide early-stage support to the industry. After all, if average retail electricity prices were to rise only 0.3% per year over the next 20 years, that is enough to justify a shift from higher carbon power generation to low-carbon and renewable generation, such as wind, according to BP calculations.

Catching The Rays

Solar power is another good bet. Based on manufacturers' shipments from 1997 to 2005, the industry grew 34% annually. The U.S. solar market represents over \$1 billion of annual sales. BP, currently the largest solar panel producer in North America, has ambitious plans for solar. Says Westwell: "We aim to lead the solar industry in its drive to cut the costs of producing solar energy down to levels at which it can compete strongly with gas and coal."

Meantime, lightweight, flexible solar technologies — such as thin-film solar shingles and devices based on nanotechnology — are attracting investment, and the new technologies and materials are improving both costs and efficiency. The sun has long been the most cost-effective power source in remote areas for such applications as telecom repeater stations, water pumping, and rural electrification, with future growth assured, because the technology is not only customizable, but portable. "As the grid begins to age and concerns about transmission outages and price spikes increase, distributed generation will take on new significance in the domestic marketplace," says Zachary Lyman, managing partner at Washington, D.C.-based consultancy Reluminati. "For years, the international markets for distributed generation have been telecommunications, uninterruptible power systems, and backup systems," he says. "That's being mirrored in the U.S. now."

Investing in America's Energy Future Board of Advisors

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Most solar installations are tied to the electrical grid, however, which means price competition with other power sources. Overseas, Japan, Germany, and Spain have achieved extraordinary growth via public support for renewable energy. Much the same is happening in California and New Jersey, with more states following. SunEdison's Shah predicts that soon the U.S. solar industry will install more than \$35 billion of solar. In fact, many believe that, on the current technology path, the cost of installed solar will reach retail "grid parity" in sunny climates as soon as 2015 due to a combination of technology advances, scale, and lower installation costs. Declining installation costs and the rise in conventional electricity generating costs mean ever-increasing momentum for solar. BP believes solar will be profitable without subsidies in sunny areas within the decade.

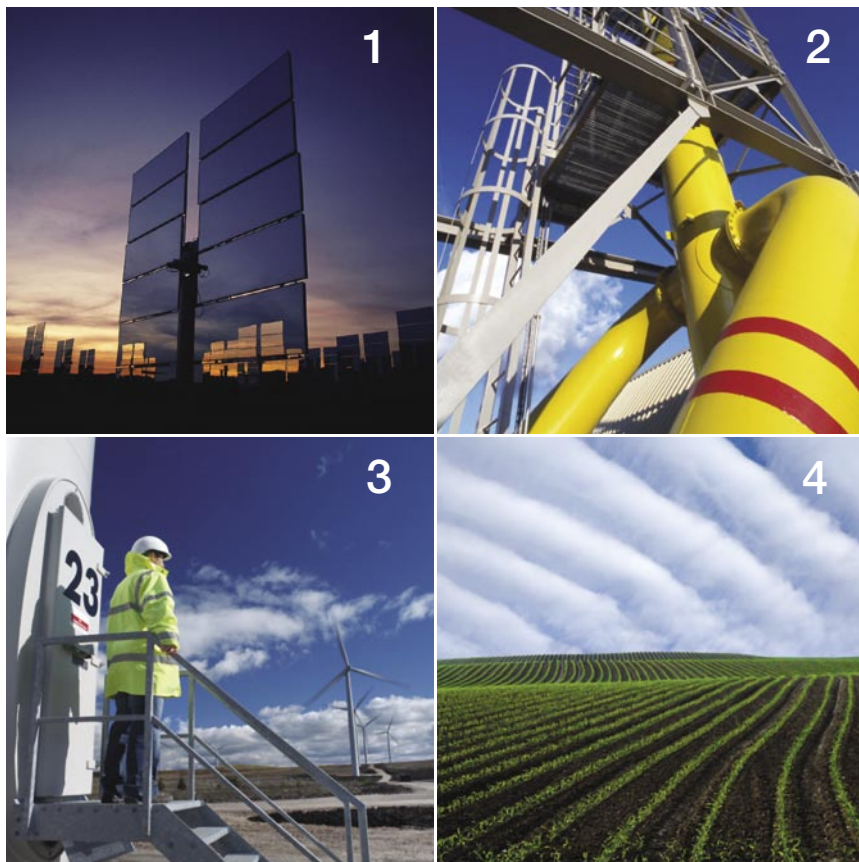
Journey To The Center

The geothermal energy industry is again heating up, after years in the deep freeze. As with all alternative energy sources, the key drivers are energy security and climate change. Almost 500 MW of power contracts were awarded to geothermal developers last year, an increase of almost 25% of the installed capacity base. State-level renewable portfolio standards (RPS) address this by requiring utilities to obtain a percentage of their power from renewable sources. In addition, the geothermal industry benefits from federal production tax credits in the 2005 Energy Policy Act.

Policymakers have good reasons to support geothermal. The technology is proven and simple; the cost is competitive with the utility grid; and the power plant cranks out electrons 24/7. However, there are relatively few spots where heat from the earth's core comes close enough to the surface to be put to economic use. The same "ring of fire" around the Pacific Basin responsible for so many volcanoes is also the source of most of the geothermal resources accessible with current technology. In the U.S., large-scale geothermal power is generally only viable west of the Rockies. Widespread, significant geothermal application may hinge on a concept now in exploratory stages: hot dry rock (HDR) technology, involving drilling much deeper than with standard geothermal, to almost two miles or more.

Gold From Dross

In the search for alternatives, biomass — organic matter such as newspaper, land-fill, certain industrial byproducts, and even some fast-growing plants — becomes increasingly attractive. Some renewables are suitable for either the power or the transport sector, but biomass, like hydrogen, works for



No oil wells here

1. The solar energy sector is booming, thanks to new technology.
 2. Geothermal energy is generated 24/7, in all kinds of weather.
 3. Major players, including BP, are investing in wind energy.
 4. Ethanol, produced largely from corn in the U.S., helps power flexible-fuel vehicles such as those from GM.
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For ethanol to fuel more vehicles, the country needs to diversify beyond corn. The new frontier is cellulosic ethanol: sugar molecules of more complex feedstocks such as trees, switchgrass, and biomass materials are distilled into alcohol. The Department of Energy estimates that producing ethanol this way could trim 60 cents from the gallon price by 2015.

both. Plenty of biomass is available — cane sugar manufacturers or paper mills, for instance, can process their waste and convert it to heat and power for their own use. Before any real market develops, though, difficulties in feedstock handling must be resolved and transport costs reduced.

Pump Me Up

Ethanol, a clean-burning, high-octane fuel, is an industry worth about \$10 billion in retail sales. Production may top five billion gallons in 2006. Around four million ethanol-ready vehicles are on the road now. Recent corporate promotion of biofuels, especially ethanol, has been significant. General Motors Corp., for instance, is promoting E85, a blend of 85% ethanol and 15% gasoline (see box on last page).

Public policy affects ethanol's supply and demand. On the supply side, a partial exemption from the federal excise tax on gasoline is passed directly to the consumer, enabling lower pump prices for ethanol-blended fuel. Demand is guaranteed by state and federal air quality regulations, requiring petroleum refiners to blend oxygenating fuel additives into gasoline. With more states banning MTBE because of potential health effects, ethanol demand is rising. Federal energy policy also helps lock in growth by mandating the use of eight billion gallons of renewable fuels annually by 2012, roughly twice today's level.

The End Game?

While there is much debate about when global oil production will roll over and begin an irreversible decline — “peak oil” estimates range from Thanksgiving 2005 to 2030 and beyond — few dispute that such a time will come. Hydrogen is seen by many as the best replacement for oil and other fossil fuels. The “hydrogen economy” vision calls for a new fuel production, delivery, and storage infrastructure. Although much has been written about fuel-cell-powered transport, hydrogen may be used to make electricity much sooner than to move vehicles.

BP Alternative Energy has set its sights on the power sector. Its plans for two large-scale hydrogen-fired power plants represent a “bridging” technology with significant near-term potential. The first, in Scotland, plans to take natural gas from North Sea fields and convert it to hydrogen and carbon dioxide. Hydrogen would be used as fuel in Scotland's Peterhead power station, while carbon dioxide would be injected more than three kilometers under the seabed. The power station is being designed to create 475 megawatts of virtually carbon-free electricity, enough to power a quarter of a million homes in the U.K. The project would also permanently store 1.8 million tons of carbon dioxide per year. The second project, in the U.S., will use

Auto Giant GM Goes Green in a Big Way



GM's FlexFuel vehicles use corn-based ethanol and sport yellow gas caps to prove it.

When it comes to renewable energy, General Motors Corp. is on the move. The world's largest automaker has launched a significant marketing and public awareness campaign to support its commitment to E85 ethanol-based fuel and the vehicles that utilize it. Says Elizabeth A. Lowery, GM vice president of environment and energy: "We've received very encouraging feedback on our E85 campaign from the environmental community, our dealers, and federal and state policymakers, among others. It's a very exciting time."

While improved internal combustion engines, hybrid vehicles, and fuel cells are part of its multi-pronged advanced technology strategy, GM is promoting E85 and the FlexFuel vehicles that can use either E85 or gasoline. The company has already put 1.5 million FlexFuel vehicles on the road, with another 400,000 planned by year-end. GM is partnering with energy companies, state governments, and other organizations to boost the availability and awareness of E85 fuel in the U.S., as well as regularly updating its OnStar database with E85 station locations across the country.

For more information, please visit www.livegreengoyellow.com

petroleum coke — a refinery byproduct also known as synthetic coal. This first-of-its-kind power plant will be an important step in making coal, our most abundant fossil fuel, a low-carbon power alternative.

An Economist's Field Day

The global market for renewables already exceeds \$40 billion. Wind, solar, and ethanol, the three largest segments, are roaring ahead at growth rates of 20% to 40% per year. Along the way, they have generated not just cleaner energy, but also jobs, wealth, and returns to investors. Meanwhile, the Nasdaq index has struggled to deliver only single-digit gains.

Workers are poised to benefit from the growth in renewables. Today, the industry contributes several hundred thousand jobs to local economies, often in depressed industrial regions like the Ohio-Pennsylvania "rust belt," and elsewhere. The ethanol industry alone created about 153,000 direct and indirect jobs last year. Add another 20,000 to 40,000 from solar,

11,500 from geothermal, and roughly 10,000 from biomass and wind, and the total direct and indirect job creation is 200,000 or more. With years of rapid growth still ahead renewables are poised to energize workers and investors alike. The rapid growth still ahead means that, over the next decade or two, hundreds of thousands more jobs will be added.

Renewable energy is real. With \$40 billion of global revenue, renewables have moved far beyond the "tofu and sandals" set and into the core business strategies of the largest energy and industrial corporations in the world. Says BP's Westwell: "We believe [we have] an opportunity to create a high-growth, world-scale business in low carbon power over the coming decade, and we're hoping that by leading the way we will encourage others to follow."

And yet, the renewables revolution has only just begun. It will not end until the trillion-dollar energy and power industry has been completely remade in its image.

Web Directory

BP <http://www.bp.com>; <http://www.bpalternativenenergy.com>

General Motors Corp. <http://www.gm.com>,
<http://www.livegreengoyellow.com>

For more information on renewable energy, log on to the Department of Energy's Energy Efficiency and Renewable Energy Web site at <http://www.eere.energy.gov>

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