

# Investing in a Greener Globe

Conventional wisdom holds that you can either make money or save the environment. But that's just not true. Here are some companies that might be as good for your portfolio as they are for the planet.

BY ANTHONY W. HADDAD

**A**s the cost of traditional energy continues to rise, alternative sources become increasingly appealing. Once we consider the environmental costs, the health costs and the security costs of maintaining and defending oil supplies, it's clear that investing in the future of our planet is something we can't afford to ignore.

Alternative energy includes wind power, solar power, hydroelectric power, biofuels, geothermal power and fuel cells. Today, around 6% of U.S. energy comes from renewable sources. The Rand Corporation estimates that by 2025 that number could grow to 25% if oil prices remain high and the cost of alternative energy continues to fall. That's good news for these companies.

#### EQUITIES Guide to Energy

One megawatt is enough power for about 700 homes.

#### Wind

Worldwide, wind power is the fastest growing alternative energy source. It's also plentiful; there's more than enough of it to power everything until the sun goes out—a few billion years from now. Wind turbines convert wind into useful power (turbines are machines that convert kinetic energy into mechanical energy). Larger turbines can mean more energy if, of course, there's wind. Speed is the other part of the wind energy equation. The energy that can be used from the wind is proportional to the cube of the wind speed, so small increases in speed mean a lot more energy.

Wind power produces no pollution. It's also fairly cheap. The price has decreased from 30 cents per kilowatt hour in the 1980s to pennies per kilowatt hour today. This price is competitive with other forms of power, and since the fuel itself (wind) is very inexpensive (free), the long-term price of the energy is stable.

Wind power produces no pollution. Over a 20 year period, a single turbine can prevent 233,000 tons of CO<sub>2</sub> from being released into the atmosphere.



The Federal Wind Production Tax Credit gives a big incentive to develop wind farms. The tax credit, enacted in 1994, provides 1.9 cents per kilowatt hour for the first 10 years of a turbine's output, which serves to lower the cost of wind energy. Turbines built before 2008 qualify.

Even this super-clean energy has a potential downside. Several sources site that wind turbines kill birds. While that may be true, it's hard to imagine turbines doing more damage than other modern sources of avian genocide like cars and trucks, airplanes, high-rises and utility transmission lines, which alone cause over 100 million bird deaths per year.

There are two types of wind companies: turbine manufacturers and wind power providers. The largest American producer of wind power is FPL Energy, a subsidiary of the **FPL Group** (NYSE:FPL). The company's 47 wind farms generate over 3,600 megawatts, around 28% of the company's total generation. "We continue to build on our strength as a clean and low-cost generator of electricity," says Lew Hay, CEO and Chairman of FPL. "We're projecting very, very strong growth in the future." FPL's first three quarters of 2006 already surpass its 2005 revenue of \$11.85 billion.

In 2005, FPL was named one of the Global 100 Most Sustainable Corporations in the world by Corporate Knights, Inc., a Canadian media company. Chosen from 2,000 of the world's largest corporations, FPL received the title after achieving a sustainability performance that places it within the top 5% of its sector. "Our actions have led to lower CO<sub>2</sub> emissions, resulting in our being one of the cleanest electricity generators in North America," says Hay.

If you prefer companies that produce more tangible products, Copenhagen, Denmark is home to **Vestas Wind Systems** (CSE:VWS, Pink:VWSYF), a pure play wind turbine manufacturer. Vestas has built and installed over 30,000 wind turbines and holds a big chunk of the market. "Vestas makes 35% of all the wind turbines in the world," says Ditlev Engel, President & CEO of Vestas. "And we are now really happy to see so many countries around the world start to embrace wind on a bigger scale."

The increase demand for turbines has been a double edge sword for Vestas. The good news is that more demand translates into more orders, which is obviously good for business. The bad news is that the company has had trouble keeping up. Vestas is looking to add to their capacity by establishing blade production in the U.S. and by expanding its facilities in Spain. "We expect the significant progress we made in 2006 to continue this year," predicts Engel. "I think both we and our suppliers are in a better position now than we were twelve months ago."

### Solar Energy

The sun shoots its energy in every direction, and only a tiny bit of this ends up on the Earth, about 44,000,000,000,000,000 watts, according to NASA. But that tiny bit is more than enough energy to meet all the earth's power needs, let alone give you a tan.

#### EQUITIES Guide to Science Jargon

**Photovoltaic** (foh-toh-vol-tey-ik), adjective.

A fancy way for saying "able to turn light into volts."

Solar power puts the sun's radiation to use. Sunlight is composed of photons containing various amounts of energy. Some of this can be absorbed by photovoltaic solar cells. When that happens, the energy in photons transfers to electrons inside the cells. With this energy, electrons are able to escape and become part of the current in an electrical circuit.

The opening of 2007 marked the start of a huge opportunity in solar power. Over the next ten years, California is spending \$3.4 billion to subsidize the installation of a million solar roofs, around 3,000 megawatts of capacity. That should keep solar companies busy. Right now, the Golden State has only 180 megawatts of photovoltaic capacity.

California-based **SunPower** (Nasdaq:SPWR) built the solar cells that are used in the world's biggest photovoltaic solar power plant, the 12-megawatt Solarpark Gut Erlasee in Bavaria, Germany. "Our cells are the highest efficiency solar cells in the world," says Julie Blunden vice president of External Relations of SunPower. "They provide up to 50% more power per square foot than conventional solar cells and are twice as efficient as thin cell technologies."

SunPower is looking to cut the cost of solar in half over the next five years. "We are really excited about it," says Blunden. "We are now within reach of solar power prices that will be competitive with retail electric rates." And SunPower is confident that they can do it with silicon solar cells. "The free market is working," she says. "The silicon feedstock market is expanding quickly."

Part of SunPower's strategy includes the likely acquisition in the first quarter of 2007 of PowerLight Corporation, which has developed an array of installation technologies. In addition, SunPower plans to increase the efficiency of its cells. "We are in the midst of transitioning from our first generation technology to our second generation technology," says Blunden. "This change will give us a 10% more efficient cell."

SunPower's revenues have consistently grown. In 2004, it made \$10 million. In 2005, it made \$80 million. In 2006, the company pulled in over \$160 million as of the third quarter and has a guided estimate of \$230 million for the year. Their estimates for 2007 reach \$360 million, not including PowerLight Acquisition, which could nearly double that figure. However, our cash flow analyst warns that SunPower, despite their products and revenue, will be out of cash by the end of 2007. Read his analysis on page 36.



The opening of 2007 marked the start of an opportunity in solar power. Over the next ten years, California is spending \$3.4 billion to subsidize the installation of 1 million solar roofs.

Traditional solar panels are made from silicon. Demand from solar cell companies as well as microchip manufacturers has put the element in short supply, causing its price to more than double in the past few years.

**DayStar Tech** (Nasdaq:DSTI) has an alternative—Copper Indium Gallium Selenide (CIGS), which require 1/50th to 1/100th of the raw materials needed for typical solar cells. Fewer than a dozen companies are currently working on this technology. “Our goal is to produce solar energy at costs competitive with fossil fuel energy, under \$1 per watt,” says Terry Schuyler, vice president of sales & marketing of DayStar. “The \$1 per watt cost cannot be achieved with traditional cell technologies, but it can with ours.” This year, DayStar will receive a \$1 million development award from the Department of Defense to help CIGS light up.

To date, the company hasn’t made much revenue, but its position in the marketplace could change that. “With our innovative technology and manufacturing process, we are positioned to shake up a \$7.4 billion-and-growing global photovoltaic market,” says Schuyler. “Just as television and computer screen manufacturers are being displaced by flat-screen technology manufacturers, solar cell manufacturers, focused on costly and limited silicon availability, are open to displacement from our CIGS solar cells.”

Despite management’s positive outlook, DayStar’s stock price has undergone a massive slide since the first quarter of 2006, falling from just under \$14 per share to a steady \$5 to \$6 in the fourth quarter. In December and January, on the heels of a failed financing deal, its stock price dipped to just a couple bucks per share as oil prices fell. And on January 19, the company announced progress in restructuring its finances. The deal includes transferring a \$15 million senior convertible note to a new investor and raising \$5 million of equity.

While wind and solar power have remarkable potential, one question remains: What can we do when the wind isn’t blowing and the sun isn’t shining? During these dark times, another power source must be our backup. Today, that often means traditional power plants. Hydroelectric, fuel

cell and biofuel companies are looking to change that.

### Hydroelectric

Hydroelectric plants use water to spin a turbine. The amount of energy extracted depends on the volume of the water as well as the difference in height between the source and the outflow. Hydroelectric power accounts for some 20% of world power and about 3% in the U.S.

Until recently, people didn’t associate hydroelectric power with pollution. Some studies now suggest that decaying vegetation submerged in large reservoirs emit greenhouse gases. While the amount of methane drops off significantly after the first several years of a plant’s existence, this pollutant, coupled with the environmental impact of submerging huge areas of land under water, makes large hydroelectric plants less attractive than they used to be. This is despite the other benefits of having large reservoirs—such as water storage and recreation areas (although the thought of speed boats zooming across a reservoir will certainly make an avid environmentalist cringe). However, compared to fossil fuel power generation, even large, storage-based hydroelectric facilities are clean energy producers.

### Nevertheless, Toronto-based Canadian Hydro Developers

(TSX:KHD) does hydroelectric power differently. As Canada’s only pure play provider of alternative energy, the company focuses on building smaller, smarter hydro plants. “We build low impact, run-of-the-river hydro facilities,” says John Keating, CEO of Canadian Hydro. The company is also getting into wind, big time.

In December 2006, Canadian Hydro acquired Vector Wind Energy (TSX:VWE), a wind farm development company, for \$4.6 million (conversion from CND to USD as of December, 21, 2006, the date of the announce-

ment). Vector has 23 active project areas around Canada at various stages of exploration and development—a potential 1000 megawatts of capacity.

Adding to that diversification, Canadian Hydro has a slew of wind and hydro projects slated to begin in 2007, three of which have been awarded 20-year power purchase agreements with the Ontario government for the purchase of electricity and renewable energy certificates. Plus, it already owns and operates 18 green power facilities: 12 hydroelectric sites, five wind sites and one biomass site. Canadian Hydro’s total capacity currently stands at 230 megawatts. But with its recently awarded contracts, the company’s capacity should swell to over 600 megawatts by 2010.

The company’s revenue for the first nine months of 2006 was \$35.1 million CND, which already surpasses its 2005 total revenue of \$28.9 million CND. And with what’s planned for 2007, there are no signs this expansion is cooling. “We’re a growth stock and investment grade (BBB) at the same time, an uncommon trait,” says Keating. “Our annual compound growth rate for three years is 39%.”

### Biofuel

Biofuel is a fuel derived from a biomass, recently living biological material or their byproducts. While production methods vary greatly, biofuels include alcohols, gases and oils. The most famous biofuel is ethanol, which is ethyl alcohol. But don’t go filling your BMW with gewürztraminer or having a tall glass of ethanol after a hard day’s work; you’ll ruin your car and your body.

As oil prices rise, ethanol looks increasingly alluring, especially with state and federal legislatures mandating its use. In 2005, the U.S. Congress passed a new energy bill requiring refiners to increase ethanol use to 7.5 billion gallons by 2012. Governors around the country have banded together to increase that number to 12 billion gallons by 2010, 15 billion by 2015 and 37 billion by 2025.

In his State of the State address, Arnold Schwarzenegger announced that California will reduce the carbon content of its motor vehicle fuels by at least 10% by 2020. Officials explain that this will likely mean adding more ethanol, possibly tripling the state’s demand.



Canadian Hydro’s low impact, run-of-the-river Upper Mamquam hydroelectric power plant.

**"We are now within reach of solar power prices that will be competitive with retail electric rates."**  
— Julie Blunden, vice president of external relations of SunPower

In the State of the Union address, President Bush said that gasoline use should be cut by 20% in the next decade by tightening vehicle fuel standards and using more ethanol.

The demand for ethanol has pushed up corn prices significantly. The supply will likely increase as farmers plant more corn in place of other crops to take advantage of the prices. In the mean time, the price of tortillas has gone up around a third in January, prompting Mexican President Felipe Calderón to force his country's producers into a price fixing agreement on corn products.

**Pacific Ethanol** (Nasdaq:PEIX) is looking to tap into the ethanol opportunity in the West. In order to meet current ethanol needs, Pacific Ethanol is constructing an ethanol production facility in California and plans on opening four other plants on the West Coast. "While we'll see some growth in the Midwest, most of the incremental growth in the market is going to be on the West Coast," says Neil Koehler, CEO of Pacific Ethanol. "Our strategy is to place ethanol plants where the largest markets are."

The company is already a player in the marketing side of the industry through its wholly owned subsidiary, Kinergy Marketing. In the third quarter of 2006, Pacific Ethanol achieved profitability for the first time. Revenues for that quarter were nearly two-thirds of the total 2005 revenues. Total revenues for the first three quarters were \$145.8 million. "In California, we have less than 70 million gallons of production in the state, and a demand for about one billion gallons per year," says Koehler. "Refineries in the state use 5.7% ethanol, less than the 10% used in the rest of the country."

Biodiesel is a fuel made from veg-

etable oils, cooking oils and animal fats that can be used in a diesel engine.

#### **Allegro Biodiesel Corp.**

(OTCBB:ABDS) is looking to break into this market in an unconventional way. The company bought Vanguard Synfuels, which had turned an ammonia plant into a biodiesel plant. "Instead of spending \$60 million or more on a new plant, we spent less than half by buying an old ammonia plant and retrofitting it for biodiesel," says Bruce Comer, CEO of Allegro Biodiesel. "It's significantly less expensive this way."

The Pollock, Louisiana plant can now produce 12 million gallons per year and, with a little capital investment, Comer believes that the plant could produce up to 20 million. Since the acquisition, Allegro has been producing biodiesel and selling it to local farmers and national distributors. "We're actively looking at opportunities to buy other plants," says Comer.

In true American entrepreneurial spirit, Allegro COO Darrell Dubroc—CEO of Vanguard at the time—was instrumental in getting Louisiana to mandate that all diesel sold in the state must have a 2% biodiesel blend. With connections in Baton Rouge, an increasing nationwide demand and a low-cost facility acquisition plan, you'll want to stay up to speed on Allegro.

#### **Geothermal**

Geothermal power harnesses the power of the earth's heat. There are three methods of doing this: dry steam, flash and binary. Dry steam plants use the planet's steam to spin a turbine. Flash plants pull hot water out of the earth. As the water rises, the boiling point drops, and the steam is used to spin a turbine. Binary plants use hot water to boil a liquid that in turn spin, you guessed it, a turbine. For each of these methods, the remaining steam and fluid

get injected back into the hot rock to pick up more heat.

Like wind and solar power, once a geothermal plant is up and running, there are little additional costs to keep it going, as the fuel itself is free and renewable. Geothermal power contributes only 0.5% of the U.S. power consumption, but that number could grow substantially since there are numerous untapped geothermal resources.

**U.S. Geothermal** (OTCBB:UGTH, TSX:GHT) is developing a geothermal power project at Raft River, Idaho. "Nine months from now, we will be making electricity from our facility," projects Daniel Kunz, CEO and president of U.S. Geothermal. "Then we will conduct an assessment and growth evaluation plan for how to put this entire property into production and achieve the real prize, which could be as much as 200 megawatts of power." The hot water at the site sits in wait for U.S. Geothermal to one mile underground. "We're commercializing an existing well field that was put in place 20 to 30 years ago," he says.

The Department of Energy spent \$40 million developing the site, but at that time, the power produced couldn't compete with the cheap and abundant hydroelectric power available in the region. Today, it's a different story. The region has grown tremendously and needs new power sources. "This property can compete very economically as a power generation source," claims Kunz.

While the company is starting by working on a proven geothermal reserve, it has also acquired a second property, and is looking into several other possible acquisitions. In 2006 alone, U.S. Geothermal raised \$54 million from investors including Goldman Sachs, SAC Capital and Wexford Capital. U.S. Geothermal expects to



Steam rises from U.S. Geothermal's Raft River property.

begin generating revenue this year, and believe its Raft River property will come on line in 2008 or 2009.

### Fuel Cell Technology

Until recently, we at EQUITIES have been anxiously awaiting a viable, commercial fuel cell ever since Professor Christian Friedrich Schoenbein of the University of Basel first invented them in 1838. (Nothing like a little Swiss fuel cell humor to spice things up).

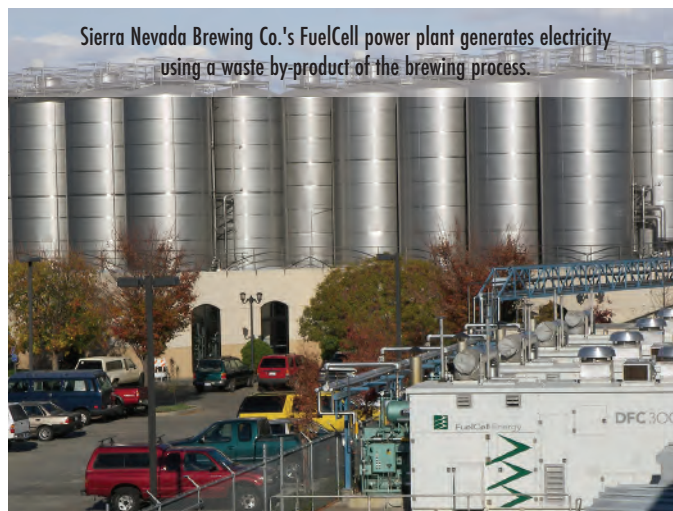
Fuel cells convert electrochemical energy into electricity. They can be run continuously, and the power comes from an external supply of fuel and oxygen.

Since going public in 1992 as the first pure play, public fuel cell company, **FuelCell Energy, Inc.** (Nasdaq:FCEL) continues to be a leader in the sector. The company boasts over 50 installations worldwide of its Direct FuelCell power plants, which create energy over 600 times less polluting than a fossil fuel plant. "The market is looking for more efficient and cleaner power," says Joseph Mahler, CFO of FuelCell. "Our fuel cells create electricity without combustion, so virtually no NO<sub>x</sub>, SO<sub>x</sub>, or particular matter is released."

Though natural gas is typically used in

a big selling point," says Mahler. "When electricity goes out, these facilities can continue to power a business, leaving no loss of production."

The company is excited about its



prospect for 2007. "We've been seeding the market since 2003, and our products have gained a lot of respect and acceptance since then," says Mahler. "Businesses are looking for energy solutions, and they're finding that we have one." Adding to its potential is the company's bid to provide a substantial number of projects as part of the Connecticut Clean Energy Fund's mandate to install 100 megawatts of clean power to the grid. "We're proposing multi-megawatt projects in the Connecticut, Asian and

Lawrence Livermore National Laboratory for commercialization in all fields of use. "There's a lot of room in the alternative energy market for a lot of different solutions," says Donald

Ceci, vice president of sales and marketing of Power Air. "Metal fuels are another solution that has yet to come to the forefront."

Power Air wants to quickly commercialize its product by initially focusing on the backup power generation market. "The attributes of metal based fuels, in this case zinc, which are non-flammable, non-toxic, non-explosive, and can be used indoors, are ideal for indoor applications," says Ceci. This market could be Power Air's stepping stone to gain access to the cash, exposure and experience needed for bigger applications with longer lifetime requirements. "We have the potential to introduce the first zinc air fuel cell indoor generator," he says. "And the potential for this product is substantial."

In the first few months of 2007, Power Air will publicly demonstrate its indoor, zero emissions generator prototype at alternative energy conferences in Japan, Germany, Canada, and the U.S. "We are going to continue to work on the development of our alpha and beta prototypes," says Ceci. "These need to be certi-

**"There's a lot of room in the alternative energy market for a lot of different solutions. Metal fuels are another solution that hasn't yet come to the forefront."**

**— Donald Ceci, Vice president of sales and marketing of Power Air**

FuelCell plants because of its availability, one third of the company's installations run on renewable sources, including the plant at Sierra Nevada Brewing Company. By using a byproduct of the brewing process to create gas fuel for its power plant, the brewery saves money, reduces emissions and won't fall victim to power outages or shortages that others in California have experienced. "Energy security and reliability is

California markets," he says. "California is our fastest growing market. As California moves to cleaner power—including fuel cells, solar and wind—fuel cells bring 24/7 reliability."

**Power Air Corp.'s** (OTCBB:PWAC) zinc-air fuel cells use oxygen and zinc pellets in an alkaline solution to create electricity. Power Air holds the exclusive worldwide license to zinc-air fuel cell technology developed at California's

fied before we can announce a product."

The company has also signed a letter of intent for a joint venture with H-Plus Eco Ltd., a Korean alternative energy company. The deal still needs to be approved by the Korean Regulatory Commissions, but it could open up Power Air to the giant Asian market. H-Plus Eco will contribute \$5 million; Power Air will contribute its technology and the joint venture will market and

sell products in Asia. “We have an opportunity for this to be doubly beneficial for us,” he says. “Power Air will not only sell to the joint venture, but it will also benefit from its success.”

### Flywheel Frequency Regulation

Though a flywheel isn't exactly an alternative energy source (and you probably have never heard of frequency regulation) the need for this type of technology is expanding—especially as we increasingly turn to alternative sources to meet our energy needs.

A flywheel works by using a motor to draw electrical energy from a primary source and store it. When the flywheel is called upon to inject power back into the line, it stops drawing energy, and the motor acts as a generator to supply power. **Beacon Power** (Nasdaq:BCON) is developing a next generation flywheel that can store 25 kilowatt-hours of electricity, which is well-suited for frequency regulation. “To our knowledge, there are no alternative technology competitors looking to enter this market,” says James Spiezio, Vice President and CFO of Beacon. “Other flywheels are used primarily for a few seconds of back-up power. They have nowhere near the stored energy capacity to do what we're doing.”

Frequency regulation is a necessary

grid service that balances power generation with load. Conventional techniques are mainly performed by fossil-fuel-based power plants that must vary power output, which consumes more fuel, increases maintenance and adds to pollution. “Because it recycles energy, our flywheel dramatically lowers greenhouse gas emissions versus conventional regulation,” says Spiezio. “A recent report from KEMA shows that a flywheel regulation plant would emit 67 to 89% less carbon dioxide than natural gas or coal-fired regulation systems. This has monetary value today and should become increasingly important as mandatory limits begin to take effect.” In addition, the increased use of renewable sources causes more power fluctuations, which in turn increases the need for efficient and sustainable frequency regulation.

In September 2006, the California Energy Commission began field trial testing of a Beacon Smart Energy Matrix, a flywheel-based frequency regulation system that consists of seven interconnected flywheels. Their tests thus far have shown that the system performs well, with better than 98% system availability. “The U.S. Department of Energy, New York State Energy Research and Development

Authority and California Energy Commission want our technology to succeed, and their positions on this are clear,” adds Spiezio. In fact, the U.S. Department of Energy recently awarded Beacon a \$752,500 contract to design a full-scale 20 megawatt frequency regulation plant, which is the size Beacon anticipates building to provide commercial service.

On December 28, one of Beacon's 25 kilowatt prototype flywheel malfunctioned while it was being powered down after several days of testing. Though disappointing, malfunctions are common during prototype testing. Beacon has brought on a team of outside engineers to help solve this problem. In January, the California Independent System Operator—the manager of electricity flow along California's power grid— certified Beacon Power's flywheel for use as a frequency regulation resource in the state.

### And then there was oil.

Alternative sources will continue to have a rough go until traditional sources are more expensive without considering added environmental, health and security costs. In some areas, this is beginning to happen, but in general, dirty fuels still reign. (Cough).

### Share Data (as of Jan 19, 2007)

Ticker	Price (USD)	(million USD) Market Cap	52 week range
ABDS	3.00	43.86	2.25 - 18.00
BCON	1.03	61.15	0.85 - 2.20
DSTI	3.32	24.54	2.00 - 15.75
FCEL	6.04	320.82	5.97 - 15.00
FPL	54.73	22,160	37.81 - 55.58
GTH	1.40	61.28	0.70 - 1.69
KHD	5.76	682.02	5.00 - 5.83
PEIX	15.63	629.78	9.95 - 44.50
PWAC	0.48	21.89	0.46 - 2.50
SPWR	42.82	2,960	23.75 - 45.09
VWS	40.17	7,438	20.05 - 43.10