

# Cleaner & Greener

Is alternative energy the next big thing?

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The potential market is huge. So are the risks. There are a total of about 50 stocks with varying degrees of exposure. Almost all have short track records, are losing money, bleeding cash, and will need more money from investors to survive. The hot money crowd is piling in and, in the last few months, some stocks have increased dramatically on not much more than hopes and dreams. If you're thinking "been there, done that", you're right. In the 1980s, biotech companies overcame these problems to become the next big thing. In the 1990s, it was Internet stocks. This decade, it could be alternative energy.

In the meantime, however, this industry still has cost and other issues that limit its widespread use. For alternative energy to become the next big thing, we'll need large capital infusions and continuing breakthroughs in technology. This industry is heavily subsidized in some developed countries, and taxpayers will have to keep paying part of the bill to keep demand growing over the short term. It would also be helpful if energy prices remain relatively high for a few more years to narrow the cost difference and keep these technologies on a glide path toward profitability. The risks are enormous, but the prize is a much bigger share of a global energy market amounting to trillions of dollars.

## The Market

If we look at BTU consumption, our energy has come from the following sources in the last 15 years.

	<u>1989</u>	<u>2004</u>
Petroleum	40.29%	40.13%
Natural Gas	23.21%	22.99%

Coal	22.49%	22.53%
Nuclear	6.60%	8.23%
Biomass	3.61%	2.85%
Hydro	3.34%	2.73%
Geothermal	0.37%	0.34%
Wind	0.03%	0.14%
Solar	0.07%	0.06%
<b>Total</b>	<b>100.00%</b>	<b>100.00%</b>

*Source: Energy Information Administration, Department of Energy*

As you can see, fossil fuels (oil, gas, coal) account for over 85% of our energy consumption and their share of the market has remained fairly constant. While this drives most environmentalists crazy, it's a rational response to the availability and low cost of these sources of energy. With their low cost, there was little incentive to conserve and demand continued to grow at just over 1% per year.

For our energy consumption patterns to change, something had to happen to change the dynamics. In this case, we should thank SUV owners and the Chinese for finally tilting the balance. The demand for fossil fuels is finally starting to overwhelm supplies and prices are going up. At the same time, technology is continuing to reduce the cost of alternative energy and clean alternatives are closer to taking an increasing share of what is probably a \$1 trillion market for energy in the U.S and several times that on a global basis.

## Wind

Wind turbines are packaged systems that include the rotor, generator, turbine blades, and drive or coupling device. The wind turns the blades of a windmill-like machine. The rotating blades are attached to a shaft that turns as the blades rotate. The turning shaft typically either powers a pump or turns a generator that produces electricity.

Due to recent breakthroughs in wind turbine design, this is the only clean energy technology with a cost of producing electricity that's comparable with

fossil fuels at the present time. Site selection is critical as winds in the range of at least 10–15 mph are required for the cost effective production of power. However, there are also a few obstacles. The enormous wind turbines are eyesores that limit site availability. They are also expensive to build, are usually located some distance from the demand for power, require maintenance, and only produce power when the wind blows.

Strangely enough, the biggest potential problem is that birds dumb enough to fly into the rotors usually end up dead. While this wouldn't cause Charles Darwin to lose any sleep, it hands environmentalists and NIMBYs a nuclear weapon to use against these operators. These groups managed to destroy the economics of nuclear power through endless court challenges and skyrocketing legal costs and, if wind turbines chop up the wrong bird, the Endangered Species Act potentially gives them the power to do the same to this industry.

Even with the problems, there are still plenty of locations available according to one expert in the industry. The Sioux Indians in the Dakotas appear to be sitting on the equivalent of the Saudi Arabia of wind, and he believes this technology has the potential to eventually provide 5% or more of this country's energy needs. However, assuming you're willing to deal with the environmental risks, finding a way to make money on the wind is still difficult as the companies making the most progress in this area are huge and wind energy is a small part of their total business.

## **Fuel Cells**

A fuel cell is an electrochemical energy conversion device that generates electricity from a variety of fuels, using a combustion-free process discovered more than 150 years ago. As a result, fuel cells don't produce the pollutants commonly associated with fossil fuels. These are also silent, compact, and can be used for many different power applications. They are similar to batteries in that they come in a variety of sizes, are capable of powering everything from cell phones to buses, and can be combined to increase power.

These run on a variety of fuels and even waste gasses from water treatment plants can be converted into electricity using fuel cells. For systems designed

to consume hydrogen directly, the only by products are electricity, water, and heat. When a fuel cell consumes natural gas or other hydrocarbons, it produces some carbon dioxide in addition. However, the carbon dioxide produced is much less than produced by burned fuel, and it's emitted in a concentrated form which makes capture and storage much easier.

Since wind and solar produce power at the mercy of the weather, the ability to produce power 24 hours a day is the most compelling thing about fuel cells. These were originally developed to supply electric power for the space program in the 1960s and were hideously expensive. As the cost has come down, they've found wider use in military bases and commercial buildings and these will have a much broader range of potential uses when costs come down further. However, it's difficult to get too excited about a technology that mostly maintains our dependence on the handful of lunatics that control fossil fuels. Renewable hydrogen is the more interesting fuel, but whether the required infrastructure will ever be built out remains an open question.

## Solar



*Installing Evergreen Solar panels on a National Park Service building at the White House*

Of the three major alternative energy technologies, solar is the one that curls our toes. Solar cells are semiconductor devices that convert sunlight into electricity using a process known as photovoltaics. They have no moving parts, require almost no maintenance. have zero

However, solar still has a few problems to overcome. The biggest is that this is still the most expensive source of clean energy. For the time being, it would be helpful for energy prices to remain high and narrow the cost difference. In addition, the polysilicon used to produce most solar panels remains in critically

short supply and prices have risen about 80% in the last 18 months. This situation may not be resolved until 2008, and raw material constraints may limit production and put pressure on profit margins over the near term. The final problem is that the production of power from solar is intermittent and dependent upon the sun.

As in wind technology, it's location, location, & location that drive the economics of solar. The more sunny days in a year, the more a solar system will be producing energy. The economics favor the southwest over the northeast in the U.S. and inland locations over coastal. The economics also favor connecting solar panels to the electricity grid as opposed to having to use rechargeable batteries or other devices to store the energy produced.

Solar is typically an expensive system to install, but once installed, the subsequent costs are low. As a result, it makes sense for a home that an owner plans to keep a long time. Even though it's expensive, it's cost effective for remote locations not covered by the electricity grid and is useful in growing third world countries that have a constant problem with power reliability and availability. As a result, according to a recent article in the NY Times, the global market for solar energy systems is estimated to be around \$10 billion and growing at about 35% per year.

As we think this is by far the most interesting clean energy technology, we plan to explore solar in more depth in an upcoming article.

## Subsidies

I'm part of a vanishing breed that still believes in free markets, but enough of a realist to know that politicians have a need to be perceived as doing something about big problems. Our current energy situation appears to be one of those things that will have politicians from both parties falling all over themselves to provide a big government solution. Rising energy prices are beginning to strain household budgets. In addition, there are legitimate security concerns with the present situation and a strong desire for energy independence. Finally, politicians appear to have a need to appease a noisy group of environmentalists who are deeply troubled that our planet is warmer than it was during the last

ice age and believe that fossil fuels are responsible for a cycle of global warming that began over 400 years ago.

The result of these concerns is likely to be more government subsidies, and we expect solar to receive the vast majority. For those of you concerned about an industry that feeds at the public trough, try to remember the last time that government subsidies on anything were cut. With the latest rise in energy prices, we think there's a very high chance that state and federal subsidies for clean energy will expand and more people will decide to get some of their tax dollars back by buying one of these systems. Even though these technologies will probably become competitive with fossil fuels by the end of the decade, we'd also be willing to bet that clean energy subsidies will remain in place long after the need for them has disappeared.

## Costs

The cost of producing energy is still the biggest issue for this industry. To gain a bigger share of the energy market, costs have to keep coming down, subsidies need to remain in place or expand, and it wouldn't hurt if oil prices remained high. However, given the huge potential market, it's a good bet that enough capital and ingenuity will be thrown at the remaining problems to make alternative energy competitive or even cheaper than fossil fuels by the end of the decade. According to one website, here's the cost per kilowatt-hour of each:

Conventional Power – 3–5 cents per kWh

Wind Turbines – 5–10 cents per kWh

Fuel Cells – 10–15 cents per kWh

Solar – 20–40 cents per kWh

*Source: <http://www.solarbuzz.com/DistributedGeneration.htm>*

It should be noted that the conventional power cost shown here is the wholesale cost, so the comparison with solar is somewhat unfair as homeowners considering solar panels are looking at the retail cost of power. In addition, since the federal government as well as most state and local governments are dying to use taxpayer dollars to help you purchase part of one

of these systems, the economics aren't as bad as they look. For anyone considering clean energy, there's a comprehensive listing of all the tax breaks available at <http://www.dsireusa.org/>.

In California, an initiative to install solar panels on a million roofs was sponsored by the Governor but died in 2005 when Democrats in the Assembly tried to add a costly provision that the labor costs to install these systems would be at prevailing trade union rates. However, it's likely that the Public Utilities Commission will create a rebate program of its own in early 2006, based upon the major provisions of the bill.

It should also be noted that the cost of producing conventional power rises dramatically during periods of peak electricity demand. In the middle of a hot summer day in states with aging infrastructure and tight supplies, it can cost up to 30 cents per kWh to find enough electricity to supply peak demand. That's when solar is producing maximum electricity and the economics of fuel cells also become viable. As it becomes more difficult to build new power plants in some states because of endless court challenges and bureaucratic red tape, utilities may very well turn partially to alternative energy to supply new demand.

It's a pretty good assumption that the cost of conventional power has risen significantly since the cost statistics shown above were published. In addition, depending upon where you live, different tax incentives can reduce the cost of these systems by 50% or more. When the cost of transmission, various taxes, and a retail markup is added to conventional power, the economics are probably coming closer to an inflection point that favors the use of clean energy.

## Investing in This Industry

Investing in companies that have a limited track record and are losing money and bleeding cash in a developing industry isn't for everyone. If you need income, are risk averse, or have a heart condition or nervous disorder, don't even think about it. Even if these stocks produce a payoff, it's certain to be a very bumpy ride requiring a strong stomach.

For someone that wants exposure to this industry but isn't interested in closely monitoring his or her holdings, a good choice is the WilderHill Clean Energy Portfolio, symbol PBW. It's an exchange-traded fund with a relatively low (.6%) expense ratio that invests in a broad range of alternative energy stocks, including some larger and established companies with a clean energy component.

For disclosure purposes, it should be mentioned that Odyssey Advisors LLC has small investments in Distributed Energy Corporation (DESC) and Evergreen Solar (ESLR) for a select group of clients. This is not a recommendation, please do your own homework before investing in any of these companies.

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