WELLS FARGO

Special Report

Identifying the Opportunities in Alternative Energy

PRIVATE CLIENT SERVICES

Identifying the Opportunities in Alternative Energy

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Executive Summary

The prices of fossil fuels, particularly oil and natural gas, have risen sharply over the past few years. As a result, alternative sources of energy — used specifically in electricity generation and transportation — are garnering increasing attention. Although they still meet only a small percentage of global energy demand, the more commercially viable alternative energy sources are growing rapidly, presenting investors with the potential for attractive long-term opportunities.

What Do We Mean by Alternative Energy?

The alternative-energy segment of the energy industry covers a broad range of sources. These sources range from well-established technologies, such as nuclear energy and hydroelectric power, through high-growth segments such as wind and solar power. They also include less tried and tested alternatives, such as hydrogen-powered, fuel-cell technology for use in both electricity generation and as an alternative to gasoline in the automotive industry. These sources cover the gamut from commercially viable and fully competitive with fossil fuels to those that are at a more experimental stage of development, presenting a bigger risk for investors who want to take advantage of the increasing attractiveness of this sector.

The Most Promising Opportunities

Electricity Generation

Currently, the three most commercially viable sources of alternative energy—in that their cost per kilowatt hour is comparable to that of coal and natural gas—are nuclear, hydroelectric, and wind energy. Due to long lead times and the potential for political considerations to stall the development of nuclear power plants and new dam projects in developed countries, we believe that the best opportunities in the nuclear energy and hydroelectric segments are in rapidly developing countries. In the developing world, countries such as China are keen to diversify their energy supply and face less opposition to such projects.

The third of these commercially viable sources, wind energy, benefits from an improving but established technology and from being a renewable energy source. As a result, this industry has grown rapidly over the past decade, specifically in Europe, where political incentives to develop renewable energy have been particularly strong. We believe that the wind-energy industry is likely to continue to expand rapidly, benefiting from improved turbine technologies that can generate a greater amount of electricity per turbine and reduce the problem that can make power generation intermittent. Newer technologies may also pacify critics who are concerned about noise and the impact on the bird population. In addition, the move toward distributed energy, which is energy supplied on a more local scale, rather than through a national grid, may benefit the wind-energy industry.

Other energy sources that also may ultimately gain from the trend toward distributed energy are the biomass segment, solar power and hydrogen-powered fuel cells. The latter two are still expensive versus traditional fossil fuel sources, with commercial viability resting on improved technologies. In spite of higher costs, both industries are experiencing good growth. With rising interest in alternative and specifically renewable energy sources, there is plenty of funding available for companies seeking to reduce the cost of producing electricity from these types of fuel. Unlike more established industries, such experimental technologies offer attractive potential returns, but also are riskier.

Transportation

The two renewable energy sources that could one day replace gasoline in the automotive industry are hydrogen and ethanol produced from biomass such as corn or sugar cane. We believe that the prospects for ethanol are more attractive than for hydrogen-powered vehicles in the near-term, as ethanol already is being used as a fuel additive in traditionally engineered combustion engines and as a primary fuel source

in flex-fuel vehicles. Established markets for ethanol-compatible biodiesel vehicles in Europe and flex-fuel cars in Brazil have enjoyed strong growth because of the rise in the price of gasoline.[1]

Meanwhile, hydrogen-powered vehicles face headwinds from not only ethanol but also from hybrid–gasoline/electricity-powered cars. Hybrids sell only at a small premium to their gasoline-fuelled counterparts, are accepted by consumers and are a rapidly growing segment of the automotive industry. In contrast, the first hydrogen car to be leased to a member of the general public cost $1 million.[2] This indicates a much longer lead time for this technology, which is likely to be dependent on breakthroughs in the technology itself and possibly an extended period of higher oil prices.

How to Invest in Alternative Energy

If you are interested in allocating some of your assets to alternative energy, you have a number of options spread across three tiers of opportunity. First, you may want to consider large established companies that are operating in established growth markets, such as nuclear, hydroelectric and wind energy. Second, there are small (and some large) publicly listed companies in developing energy technologies such as biomass, solar and fuel cells. The third tier is privately held, non-listed companies developing experimental technologies such as nanotechnology-based solar panels.

In the first tier, it is possible to add individual, well-established publicly traded companies to your portfolio. To ensure adequate diversification and access to the potential for rapid growth in second tier, smaller publicly listed companies operating in newer technologies, you may want to consider investing in an exchange traded fund (ETF) or a mutual fund that specializes in renewable energy.

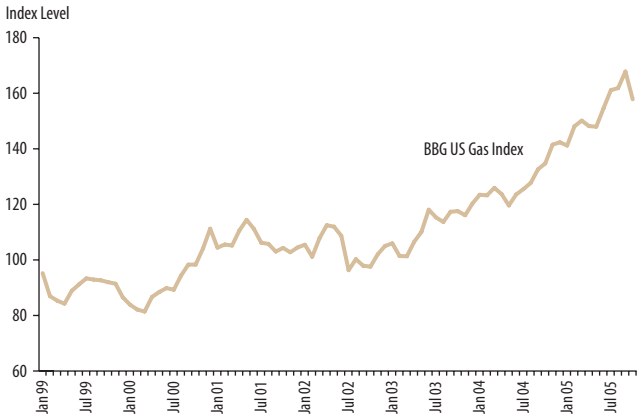
The final tier, comprising privately held, venture-funded companies, only is available to accredited investors. This includes individuals or couples who jointly have more than $1 million in investable assets; an individual who earns more than $200,000 per year; or a couple who earns more than $300,000 per annum. If you meet the criteria, you also need to consider whether such investments are suitable for you.

[1] "Where Do You Get Your Energy from? Latest on Alternative Liquid Fuels," *Energy Bulletin*, 10/03/05
[2] Honda press release, 06/29/05

Introduction

The price of oil has risen dramatically over the past couple of years, as has that of natural gas. (Figure 1) The market has been stoked by increasing global demand, but also by fear of disruption due to geopolitical and weather-related concerns. Not surprisingly, energy has been the best performing sector of the large-cap benchmark S&P 500® Index this year.[3]

Figure 1
Gas Prices — Bloomberg U.S. Gas Index



Source: Bloomberg, 11/11/05

With such a sharp run-up in the price of both crude oil and natural gas, as well as in the prices of the stock of companies involved in oil and gas production and servicing, do the potential opportunities in the energy sector instead lie with companies that are investing in alternative energy sources?

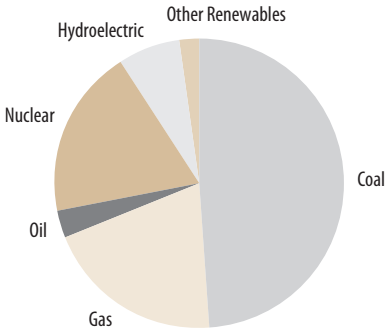
In this report, we look at the different types of alternative sources to determine which are the most viable over the longer-term and, as a result, have the greatest growth potential. We also review the investment vehicles that can enable individual investors to take advantage of this potential.

Before we delve into the pros and cons of alternative fuels, however, it is worth offering a snapshot of the energy market as it is today.

Snapshot of the Energy Sector

There are three primary uses of energy: electricity, heat and transportation. As shown in Figure 2, electricity generation in the U.S. is dominated by coal, which remains relatively abundant versus oil and gas. Natural gas, however, has been making inroads into this segment of the market and now accounts for 18 percent of electricity generation.[4] Uranium, through nuclear energy, and hydroelectric power also contribute a significant share.[4] Natural gas is mainly used to generate heat, while oil dominates the transportation segment. Other than hydroelectric power, renewable energy sources such as wind power and solar energy don't even register in any of these energy market segments, accounting for just 0.7 percent of the market in 2004.[4]

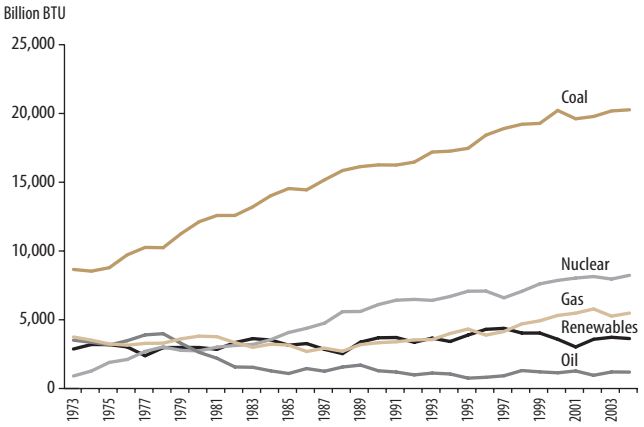
Figure 2
U.S. Fuel Sources Used in Electricity Generation



Source: Energy Information Administration, 11/05/05

Interestingly, since the last oil crisis in 1979, coal has seen the most significant growth in U.S. consumption. In contrast, as Figure 3 shows, consumption of oil was actually falling until the late 1990s, partly as a result of increased efficiencies in oil use and its declining role in electricity production.

Figure 3
Growth in Fuels Used to Generate Electricity

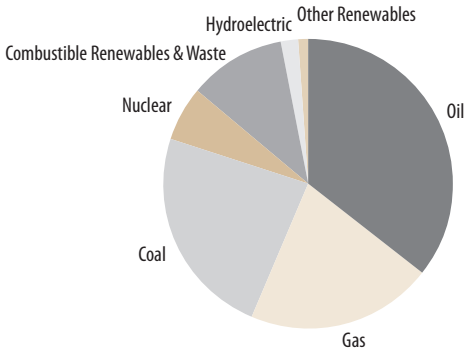


Source: The Bottomless Well

[3] Bloomberg, 08/31/05
[4] Energy Information Administration (EIA), 09/05/05

As Figure 4 indicates, the picture is similar in the rest of the world. It is clear from this picture that, on a macro basis, oil, gas and coal continue to dominate. Nuclear energy plays a role, but, besides hydroelectric power, renewable energy sources — at least on the surface — appear to have a long way to go to even make a dent in the current global energy market.

Figure 4
World Energy Sources



Source: IEA, 2/05

On an individual state level in the U.S., and on an individual country level, however, the contribution of alternative energy sources is not as limited as it may seem. An example of an outlier in the U.S. is California, where two of the major utility companies, Pacific Gas & Electric (PG&E) in northern California and Southern California Edison (SCE) in the south of the state, take a significant proportion of their electricity from renewables: 32 percent[5] and 18 percent[6] respectively. While the lion's share is generated by hydroelectricity, 13 percent[5] of PG&E's electricity output comes from solar, wind, biomass and small hydro projects, and a new solar energy project in the Mojave Desert is expected to add nearly 20 percent[6] to SCE's renewable energy sources.

Elsewhere in the world, 77 percent of the electricity generated in France comes from nuclear energy and 20 percent of Denmark's electricity is generated by wind power.[7] Moreover, solar power is seen as a potential solution to the dilemma of bringing electricity to African communities that lack power lines and generators.

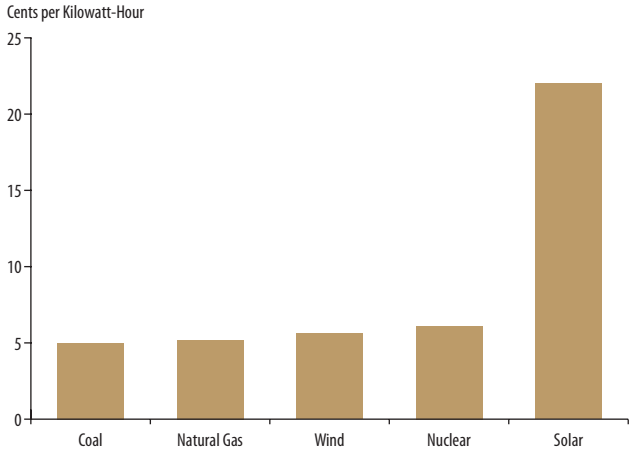
Additionally, as oil, gas and coal prices have risen, a grassroots effort to diversify energy sources has begun to materialize at the state level in the U.S. Local and state governments are beginning to offer incentives for the introduction of renewable energy sources in the energy mix and, in some states, are requiring utilities to include renewable sources in their long-term plans. Massachusetts, for example, has written into law that 4 percent of state electricity must come from renewables by 2009.[8]

Compared to a 2001 European Union directive, the Massachusetts law looks conservative. According to this directive, 22 percent of electricity is targeted to come from renewable energy sources[9] by 2010. In the U.K., the aim is to reach a 10 percent goal by 2010 and 20 percent by 2020.[9] The drive towards alternative sources of energy in Europe is partly a reflection of concern about climate change — as illustrated by European nations' signatures on the Kyoto Protocol — and partly as an integrated energy strategy that aims to achieve broad diversification of their energy supplies.

It is clear, however, that legislation, driven by an awareness of risks and a grassroots desire for less-polluting energy sources, is not enough on its own. Market forces also are likely to determine to what extent the energy mix changes over time and, therefore, where the best investment opportunities are likely to arise. If oil and gas prices stay high or rise further, there is likely to be additional incentive to diversify away from traditional fossil fuels as the main providers of energy for electricity, heat and transportation. Likewise, if there is a technology breakthrough that makes alternative sources more attractive in terms of cost per kilowatt-hour, we are likely to see a move away from traditional energy sources.

On the other hand, if the price of fossil fuels declines from today's peak and there are no technology breakthroughs, the outlook is likely to be mixed. As Figure 5 illustrates, while some alternative energy sources appear to be competitive with traditional fossil fuels, others have a ways to go at present prices and with present technology to achieve the economics that are likely to promote a major shift in demand.

Figure 5
Cost per Kilowatt-Hour of Different Energy Sources



Source: National Geographic, 8/05

[5] Pacific Gas & Electric (PG&E) Web site, 09/09/05
[6] "Power from the Sunbaked Desert," *BusinessWeek*, 09/12/05
[7] "Future Power: Where Will the World Get Its Energy Fix," *National Geographic*, 8/05
[8] "Alternative Energy: Law Determines that Green Means Growth," *Financial Times*, 04/30/03
[9] "Overview: Renewable Energy," *Financial Times*, 04/30/03

Alternative Energy: What Are the Major Sources and Opportunities

Nuclear

With oil prices relatively high and concern about the potential impact of fossil fuels on the environment, talk of a nuclear-energy solution is enjoying a revival. This talk comes at a time when new technologies are available to make nuclear power safer and help deal with the issue of disposal of radioactive waste.

Advantages

Nuclear energy has a number of positives going for it. First, it does not give off carbon emissions, earning it supporters in the environmental community among those concerned about global warming. Second, unlike oil, two of the three largest producers are Australia and Canada, both of which have stable governments and represent reliable sources of supply.

Figure 6
Known Recoverable Resources of Uranium

	Tonnes	Percentage of World Resources
Australia	1,074,000	30%
Kazakhstan	622,000	17%
Canada	439,000	12%
South Africa	298,000	8%
Namibia	213,000	6%
Brazil	143,000	4%
Russian Fed.	158,000	4%
USA	102,000	3%
Uzbekistan	93,000	3%
World total	3,537,000	

Source: Uranium Information Center, 9/05

Third, once reactors are built, it is very cost effective to keep them running at high capacity and for utilities to address demand fluctuations by cutting back on usage of fossil fuels. Fourth, nuclear plants tend to last a long time and many existing plants have become more efficient over time, reducing their demand for uranium.

Disadvantages

There are a number of disadvantages to the nuclear-power option. These include not only the obvious safety questions but also some economic and supply-related questions that are currently being debated by those for and opposed to renewal of outdated power plants or an expansion of the sector.

In terms of safety, two issues are regularly debated. First, the issue of nuclear waste and, second, concerns over potential terrorist attacks on nuclear power plants. The first objection may be overcome through the introduction of new types of power plants, such as the pebble-bed modular reactor. This type of reactor uses graphite balls flecked with tiny amounts of uranium, rather than conventional fuel rods. With the fuel encased in graphite and impermeable silicon carbide, the theory is that the waste should be relatively easy to dispose of. The terrorism fears are less easily addressed and may ultimately stall the construction of new plants in countries such as the U.S., where these worries are greatest.

Among economic concerns is the question of construction costs. Although the cost of energy produced by existing nuclear plants is competitive, the upfront capital costs of constructing new plants are extremely high, calculated at $1,300-$1,500 per kilowatt- hour, or twice the amount it costs to construct a gas-fired power station.[10] In addition, nuclear plant operators are subject to a government tax to help pay for the disposal of nuclear waste, pushing potential costs even higher. Given the long life of nuclear power stations, however, supporters argue that the upfront costs, at least, are justified.

Another concern is the availability of the main fuel source, uranium. Having been stable for a number of years, uranium prices nearly tripled between March 2003 and May 2005. As in the case of oil, the source of this jump in prices can, in part, be traced to China. Both the Asia Pacific Foundation of Canada and the Uranium Information Center (UIC), an Australian-based organization, believe that more supply will have to be found to meet growing demand in Asia and in a revival of interest in the western world. Only 55 percent[11] of supply currently comes from primary mine production, with the rest coming from military and other sources, such as reprocessed fuel from the power stations themselves. Both organizations believe that this percentage is likely to rise in the future, along with production.

Outlook

In many countries, concerns about safety, short-term economics and supply of uranium are likely to be outweighed by the desire to acquire a relatively non-polluting and secure source of power. China, for example, plans to build 30 new plants by 2050, generating as much as 300 gigawatts[10] of power. In certain European countries, such as France and Finland, nuclear energy is a lot more popular than it is in the U.S.

[10] "Nuclear Energy: Come-back Kid or Ugly Duckling?" *Financial Times*, 10/04/04
[11] UIC, 9/05

In the U.S., however, the concerns are sufficient to delay new construction; it may be as long as a decade before any new nuclear plant is completed. As a result, we believe that the best short-term opportunities lie in overseas markets and, outside of developing markets such as China, in the renewal of existing power stations.

Hydro

Power generated from water, primarily from large-scale dams, accounts for approximately 20 percent of global energy production, by far the greatest contributors of all renewable energy sources. Global hydroelectricity production grew by 5 percent in 2004, with 50 percent of that growth coming from Asia.[12] Countries with an abundance of opportunities for producing power from this source, such as Norway, Austria and Iceland, use it for the majority of both base- and peak-electricity generation needs. In other countries less blessed, hydro capacity is usually applied to peak-load electricity, because it can be readily stored in off-peak hours.

Advantages

In addition to its renewable credentials, one of the key advantages of hydroelectric power is its ability to handle both seasonal and daily peak loads. At peak times of electrical demand, water releases from the reservoir behind the dam through a turbine, generating hydroelectricity. During periods of lower electrical demand, however, excess electrical capacity can be used to pump water into the higher reservoir, effectively "storing" the electricity for later use. Pumped-storage hydroelectric reservoirs also are used sometimes to store electricity produced by thermal plants for use during peak times. It is this built-in flexibility that has contributed to the success of hydroelectric power, in spite of the higher capital costs involved in dam construction and the other disadvantages listed below.

Disadvantages

The disadvantages of hydroelectric power generated through large-scale dam projects are its potential impact on wildlife and agriculture downstream from the dam, the possibility that it may displace the local population, and, ironically, greenhouse gas emissions:

- In terms of the impact on wildlife, the main concern is a dam's effect on fish, such as salmon. The industry is currently researching turbine and power plant designs that are kinder to aquatic life.
- Water released from dams contains little suspended sediment, which can lead to greater erosion downstream and prevent sediments from enriching farm land through irrigation.
- People may need to be displaced from areas where a dam is planned. For example, the Three Gorges Dam project has displaced an estimated 1.1 million people in China.
- Reservoirs may produce substantial amounts of carbon dioxide and methane gas because of the decay of plant material in areas inundated. The methane releases once the water is discharged from the dam and goes through the turbines. The only solution is to clear the reservoir growth.

Outlook

We believe that global growth in hydroelectric power is likely to continue to accelerate over the next five years, but is likely to be concentrated in developing countries rather than transitional or developed ones. One significant contributor to future growth is the controversial Three Gorges Dam project in China, which is scheduled to reach its final stages of construction in 2009. All 26 generators supported by a system of dams on the Yangtze River are slated to be operational by that date, generating some 19.2 gigawatts[13] of power, while also helping to control flooding in the lower reaches of the river. China is developing other large hydroelectric projects, as have other Asian countries including India, and Middle Eastern countries such as Iran.

It is worth noting that other sources of hydro power are also beginning to gain some attention, albeit on a much smaller scale. These include tidal and wave power. Tidal power harnesses the energy of either currents created by the tides or, through the use of a barrier, the changing depth within a basin as a result of tidal flows. There are a number of tidal-power generating plans being considered globally, the largest of which are in Russia, the U.K. and India.

Wave power is also undergoing tests with a view to harness it more broadly, but it is in a much earlier stage of development than the technology for harnessing tidal power. Distinct from tidal energy, technologies being tested include pontoons lying in the water that use wave action to push and pull a generator, and a rubber membrane mechanism that uses the pressure of passing waves to pump water to shore to drive generators. This technology is particularly appealing for countries with large coastlines, such as Australia and the U.K. but has some way to go before it is viable.

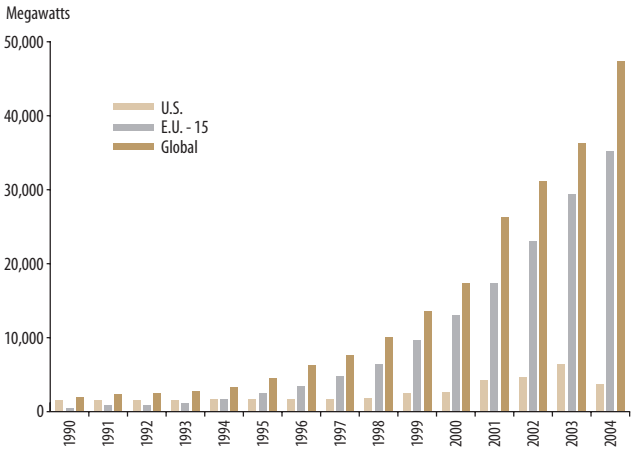
[12] *BP Statistical Review of World Energy*, 2005
[13] Wikipedia.com, 9/05

Wind

With the exception of hydroelectric power, the wind-power industry is far more developed than most other types of renewable energy. Over the past decade, the technology associated with wind power has improved significantly. New designs for adjustable blades on wind towers now allow wind farms to be sited in areas that lack steady winds. In addition, wind turbines that generate the electricity from strengthened fiber blades can produce more electricity than in the past — the average electricity-generating capacity of a newly installed turbine has risen from 200 kilowatts in 1990 to 2.5 megawatts today[14] — leading to greater efficiency and upgrades of existing plants. Moreover, turbine manufacturers are developing new designs that will require less maintenance.

The industry has enjoyed very strong growth since the late 1990s, as wind turbine technology has become more efficient and political directives encouraging energy diversity, in Europe in particular, have encouraged investment. In 1997, wind power generated only 7,636 megawatts of power, but this figure had risen to 47,912 megawatts by the end of 2004, a more than six fold increase. Figure 7 illustrates this strong growth rate. As a result of this growth, the *BP Statistical Review of World Energy 2005* notes that "wind power capacity additions have exceeded those of nuclear power since 1998, signaling wind's emergence as a mainstream energy source."

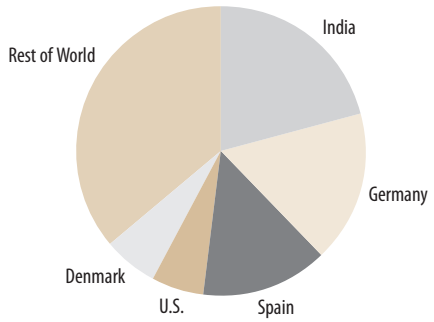
Figure 7
Cumulative Installed Wind Capacities



Source: U.S. Wind Energy Association, European Wind Energy Association, 11/11/05

As Figure 8 shows, during the past five years Europe has dominated growth in demand for wind-generated power and the Continent now accounts for some 72.5 percent of the total share of global wind-generated power. Within Europe, the three largest markets are Spain, Germany and Denmark, where this type of power generation accounts for 6.5 percent, 5.0 percent and 20 percent of their total electricity generation, respectively.[14] Spain's goal is to increase this share to 15 percent by 2010, while Germany's goal is to increase the percentage of electricity generated by this method to 14 percent of the total by 2015.[15]

Figure 8
Global Market Share for Wind Energy



Sources: U.S. Wind Energy Association, BP Statistical Review of World Energy, 2005

Europe is obviously a significant player in this market, but the fastest growth in this type of power generation is in the Middle East and Asia-Pacific markets. Wind-generated power output grew by 42.3 percent and 43.5 percent respectively year-over-year in these markets in 2004, with Iran and India emerging as the major markets.

Figure 9
Top Nine Suppliers of Wind Turbine Equipment

Company	Country	Market Share
Vestas	Denmark	34.1%
Gamesa	Spain	18.1%
Enercon	Germany	15.8%
GE Wind – a division of General Electric	U.S.A.	11.3%
Siemens	Germany	6.2%
Suzlon	India	3.9%
REpower	Germany	2.8%
Mitsubishi	Japan	2.6%
Ecotecnia	Spain	2.6%
Nordex	Germany	2.3%

Source: www.Earthscan.co.uk, 8/18/05

Advantages

There are a number of notable advantages associated with wind power:

- It is a clean, renewable energy source.
- There is no fuel component, so once built there is no reliance on a finite fuel supply or costs associated with such a supply. As such, wind energy can provide a hedge against fuel-price volatility.

[14] European Wind Energy Association, 9/05
[15] Renewable Energy Access, 08/24/05

- Wind power can be generated in remote areas, including out in the oceans.
- It is scalable in that it can be used to generate power in a local area or even at the individual property level, but can also generate large amounts of power that can be added to an electricity grid system.
- It is cost competitive, with the cost of construction of a wind farm lower than construction costs of many types of conventional power plants. Cost per swept rotor area (kwh/m^2) fell by 30 percent between 1989 and 2001 as a result of lower interest rates and reduction in turbine costs (which account for 80 percent of the total cost) coming from economies of scale.[16]
- Today, wind-generated energy costs less than 5 cents per kilowatt-hour, comparable to natural gas at today's high prices.
- For land-based wind farms, once the wind towers are installed, the land area around them can be used for other purposes, such as agricultural use.

Disadvantages

As with any source of energy, there are some drawbacks to wind power. The most significant is that the wind to drive the turbines may be intermittent and that it does not always blow when electricity is needed. Wind energy may only be available 40 percent of the year in some areas versus 90 percent for a fossil-fuel powered plant. New blade design can overcome this problem to a certain extent, as can storing the energy in batteries, but because of these potential drawbacks, the site of the wind farm is key to its success and vice versa.

For wind, an intermittent source of power, to be linked into the electricity market, utilities need to develop a strategic grid network — one in which other types of power generation can be switched to low output to compensate for high wind energy output and vice versa.

Because of the intermittent nature of wind, there are concerns that if this source of power reaches a certain size in relation to other power sources in a national electricity grid, the grid may destabilize. The European Wind Energy Association argues, however, that the geographical dispersion of wind farms is likely to even out the flow once such farms reach a critical mass.

Other issues include concerns over the visual impact of the wind towers, the noise they make and their impact on birds. As the U.S. Department of Energy notes, however, most of these problems have been resolved through correct location of wind farms and technology breakthroughs.

Outlook

We believe that the outlook for wind-generated power is encouraging. In Europe, in particular, there can be little argument that this type of energy generation has moved into the mainstream. In Asia — a region that is experiencing rapid rates of economic growth and wants to diversify its energy supply, allowing it to become less reliant on imported fuels — it is clear that the attraction of this type of energy generation also is growing. In our view, that an Indian and a Japanese company are among the top 10 providers of wind turbines suggests the opportunities that they see both at home and across their regions.

Interest is also on the rise in the U.S. With the price of fossil fuel rising sharply and concerns about the stability of supply mounting, states, investors, and utilities are taking a second look at wind power. Twenty states in the U.S., as well as the District of Columbia, have signed on to the renewables portfolio standard (RPS), requiring that a minimum amount of energy be supplied from renewable sources. These states include California, Texas, New York and Illinois. The wind-energy generating industry has been a major beneficiary. This year the U.S. is on target to increase generating capacity by 2500 megawatts, a 66 percent year-over-year rise.[17]

As an indication that wind power is becoming more mainstream, in July, John Deere, the world's largest manufacturer of agricultural equipment, announced plans to create a new business, offering financing to U.S. and European farmers who want to "harvest the wind," their newest cash crop. The company announced that by the end of 2005 it expects to increase its investments in wind energy from $8 million to $60 million.[18] Moreover, famed investment guru, Warren Buffet, is also a convert. MidAmerica Energy, a subsidiary of his investment firm, Berkshire Hathaway, is set to begin construction on a 310-megawatt wind farm in Iowa this year, increasing the state's wind-energy generation capacity by 66 percent.

Based on estimates of new projects either already under construction or in the planning stages, we believe that the rate of growth in the wind-power industry is likely to remain strong. According to the *2005 BP Statistical Survey of World Energy* that quotes a study by Danish consultants, BTM Consult, global installed capacity could rise to 117 gigawatts by 2009, suggesting an annual growth of 20 percent over the next five years, helped, in part, by the upgrading of existing capacity through the use of more high-powered turbines.

[16] European Wind Energy Association, 9/05
[17] American Wind Energy Association, 08/03/05
[18] "Deere to Help Farmers Cash in on Wind," *Financial Times*, 07/28/05

Solar

Solar energy is, perhaps, the first energy source that comes to mind when most people think of renewable sources of energy, but — unlike wind — solar power is still a long way from being mainstream. In fact, it accounts for less than 1 percent of the world's energy.[19]

There are two main ways to harness the power of the sun to generate electricity: photovoltaic (PV), where sunlight is directly converted into electricity via solar cells, and solar-thermal power. PV is a proven technology that is most appropriate for small-scale applications to provide heat and power to individual houses and businesses. Sunlight falls on a layer of semiconductors, which jostles electrons. This, in turn, creates an electrical current that can be used as a source for heat.

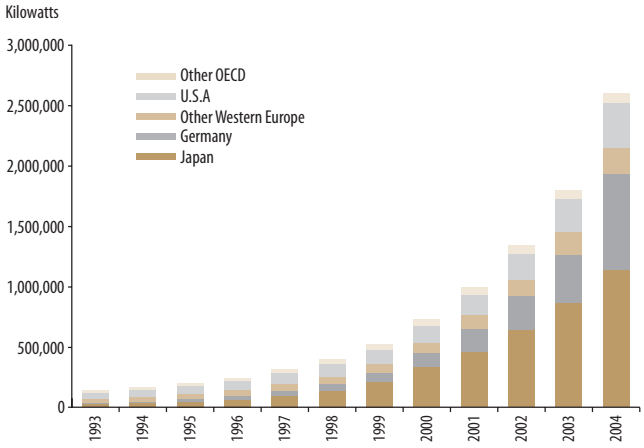
Solar PV cells are already cost effective for powering houses and businesses in some regions. As with wind power, technological developments have reduced costs considerably over the last few years. Unlike wind power, however, large-scale electricity production using solar energy costs about 22 cents per kilowatt-hour, significantly more expensive than its fossil fuel competitors and nuclear energy.

Hopes to reduce these costs lie with newer technologies. Solar-thermal generated energy is only just emerging from the experimental stage to full-scale electricity production. Solar-thermal power concentrates the sun to heat up fuel such as gas or oil. The heat trapped within is then used to convert water into steam, which powers a conventional steam turbine to generate electricity. Fossil fuels are sometimes used as a back-up to heat the water in the boiler if the sun is not shining. There are three different methods for concentrating the sun's rays:

- Parabolic Trough — This method uses long, parallel rows of glass mirrors in the shape of a trough to concentrate the sun's rays toward the "absorber tube" — usually filled with oil — to maximum effect.
- Power Tower — Similar in principle to parabolic-trough technology, the mirrors are placed in a circular pattern. At the center of the circle is a tower, at the top of which is a receiver filled with water, air, liquid metal or molten salt that moves to a power block and is used to power a steam turbine.
- Parabolic Disk System — In this system, dishes rather than troughs are used to concentrate the power of the sun. An example of this type of solar project is the 500-megawatt Solar Energy Systems plant being constructed in the Mojave Desert in California. By the end of 2006, the company expects to begin supplying electricity to Southern California Edison (SCE), but will not be fully operational until 2011, when it may account for as much as a 20 percent increase in SCE's electricity generation from renewables.[20]

As is the case with wind energy, solar power has most traction in countries such as Germany, Spain, Cyprus and Japan, all of which offer incentives to improve the uptake of renewable energy sources as part of their implementation of a diversified energy policy. In Cyprus, more than 50 percent of hotels and 90 percent of homes have solar water heating.[21] As Figure 10 illustrates, such policies enabled Japan to develop a healthy lead in this industry, producing nearly half of the PV cells manufactured.

Figure 10
Cumulative Installed Photovoltaic Power



Source: BP Statistical Review of World Energy, 2005, International Energy Administration, 11/11/05

Advantages

In spite of its cost versus other sources of energy, solar power is attracting interest due to the following:

- Solar energy makes use of a renewable natural resource that is readily available in many parts of the world.
- The process used to generate solar energy is emission-free.
- Technological advances have reduced costs to a point that it can compete with fossil fuel alternatives in specific circumstances.
- The technology is scalable in that it can be used for domestic heating purposes or on a larger scale for commercial electricity generation, as solar water heaters are an established technology, widely available and simple to install and maintain.

[19] "Beyond Oil," *National Geographic*, 8/05
[20] "Power from the Sunbaked Desert," *BusinessWeek*, 09/12/05
[21] *Renewable Energy Resources: Characteristics, Status of Development, and Potential*, International Agency for Solar Energy, 2003

Disadvantages

The biggest barriers to increasing solar power generation are the cost, the amount of land required for large-scale electricity production, and the intermittent nature of the energy source. In terms of the latter, thermal systems do not work at night or in inclement weather. Storage of hot water for domestic or commercial use is simple, needing only insulated tanks, but storage of the higher-temperature liquids needed to generate electricity on a large scale — or storage of the electricity itself — requires further technological development.

Outlook

Although wind power is more economical and has been more widely adopted for large-scale power production than solar energy, solar power is the most flexible in scale and application. It also is widely available and an environmentally benign source of renewable energy. It is currently a $7 billion per year business that is growing at 40 percent per annum, but we believe it has even greater potential for growth in the future.[22]

More wide-scale adoption of solar power is likely to depend on technological breakthroughs that can reduce the cost of both the PV cells and solar-thermal energy. It also may be contingent on government support. Such support may give manufacturers and companies that supply solar power sufficient ability to achieve economies of scale, which ultimately reduce costs. For companies working to achieve technological breakthroughs, the aim is to reduce the cost of producing electricity to 50 cents per watt.

Various companies are working to produce thinner and more effective materials for use in PV cells. The U.S. Department of Energy believes that it may be possible to break through the 50 percent efficiency level by using new materials based on nanotechnology (the science of building devices from single molecules or atoms). Venture capital companies have increased funding in this area over the past few years, and there is a positive investment environment in both Europe and Japan for these types of companies.

Hydrogen

Hydrogen — and more correctly, liquid hydrogen used in fuel cells — is a much talked about source of non-polluting renewable energy that its supporters see as ultimately liberating us from reliance on imported oil. Similar to a battery, a fuel cell uses a catalyst to create a reaction between hydrogen from a fuel and oxygen from the air to generate electricity, with the only byproduct being water. Such fuel cells can be used for power generation and as a replacement for the combustion engine to run cars and other vehicles.

Fuel cells have long been used in the U.S. space program, but until the past few years have proved prohibitively expensive for civilian use. Interest in fuel cells was reignited in the late 1990s, as companies began to make breakthroughs in technology. Large automotive manufacturers, such as General Motors and Daimler Chrysler, also started investing in fuel-cell companies and began to design concept fuel-cell powered vehicles. On the power-generation side of the business, companies such as General Electric began to take a more keen interest. And even major oil companies, such as BP and Shell, are seeking to diversify their energy portfolios by investing in hydrogen research.

Development, thus far, has focused primarily on proton-exchange membrane (PEM) fuel cells. This type of fuel cell uses a polymer membrane to separate two subcells, one fed with hydrogen and one with oxygen (through air). On the hydrogen side, the hydrogen breaks down into protons and electrons, and the protons migrate through the membrane into the oxygen side. The electrons, on the other hand, are forced to detour through wire connecting metal plates, resulting in a reaction that creates electricity.

Other types of cells include the molten-carbonate fuel cell, which is the most efficient design but is very complex and only economical when generating more than 200 kilowatts. Westinghouse is developing a competing design, the solid-oxide fuel cell, which operates at extremely high temperatures and has the added advantage that waste heat can be used to drive an auxiliary gas turbine.

What are the Challenges to Large-Scale Hydrogen Production?

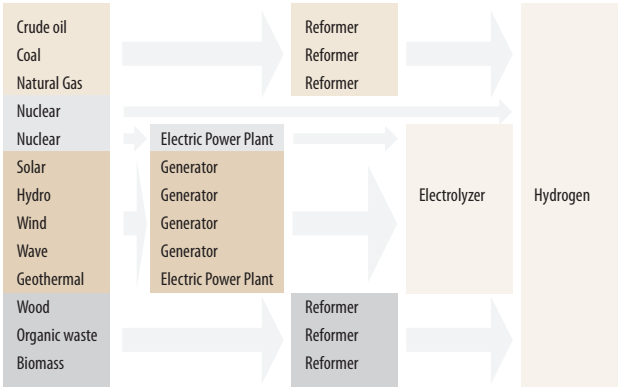
One of the biggest challenges to moving towards large-scale adoption of the "hydrogen economy" is production of hydrogen itself. A question often raised is whether it takes more energy to produce the hydrogen than you get back when you either drive the car or use it to power a building.

There are currently three ways to produce hydrogen:

- Natural gas, coal, wood and organic waste burn with air and steam at extremely high temperatures. When cooled, the resulting gases contain a significant amount of hydrogen.
- An electrical current is passed between two electrodes (an electrolyzer) immersed in water. Hydrogen rises up from the negative electrode and oxygen from the positive electrode.
- Some bacteria reportedly produce hydrogen, but this method has yet to be exploited commercially.

[22] *Basic Research Needs for Solar Energy Utilization: Report of the Basic Energy Sciences Workshop on Solar Energy Utilization*, U.S. Department of Energy, 4/05

Figure 11
Ways to Generate Hydrogen



Source: Congressional Energy Report, 2004

The first of these options has traditionally been the most cost-effective. That it still requires the burning of fossil fuels, combined with the rising price for natural gas, however, makes it less attractive as a long-term solution.

The second option is simple to establish and can be done on a small or large scale nearest the point where the hydrogen may be needed. However, it also has a major drawback. Although this method has a 98 percent efficiency rate, when you factor in the voltage of the fuel cell, you get back only 40 percent of what you put in.[23]

There are two powerful arguments for converting electricity into hydrogen, in spite of the inefficiency of the process:

- The first is the "use it or lose it" principle. Electrical power itself cannot be stored in its pure form; it needs to be converted to something else. Just as surplus nuclear and gas-fired power stations may store unused power by using it to pump water back up inside a damper as part of an integrated electrical storage system in combination with a hydroelectric power plant, hydrogen can be similarly used to store unused electrical power.
- Second, electricity stored as hydrogen is versatile. Not only can it be used for re-electrification, it also can potentially be used as fuel for cars or for producing heat.

Moreover, as both hydrogen extraction and fuel-cell technology improve, it is possible that we may see an improvement in the expenses of the hydrogen economy in the future.

How Near are We to Realizing a Hydrogen Economy?

If we never achieve the hydrogen economy or, as it turns out, hydrogen as a fuel source does not happen for decades, it will not be for wont of trying. As noted earlier, many large, well-established companies and numerous small start-up firms are conducting extensive research into this area.

Electricity Generation

In Europe, RWE, Germany's largest electric power company, maintains that by 2015 about 10 percent of electricity in Germany will be generated by fuel cells. In fact, the company plans to market compact power plants for private households by 2010.[24] In North America, smaller companies like Ballard Power, Plug Power, H-Power and Fuel Cell Technologies are crowding into the market, as are larger players such as General Electric and Siemens Westinghouse.

An example of a pioneering power plant that uses hydrogen as a source of power is the BP and Scottish and Southern Energy plant in Peterhead, Scotland, which intends to produce electricity to power 250,000 houses.[25] In addition, Siemens is building a hydrogen-powered plant in Pittsburg, Pennsylvania.

On the positive side, fuel cells are ideally suited to mass production. If demand for such power plants increases, we believe that mass production has the potential to reduce costs considerably. Nevertheless, given the continued high costs associated with this type of energy, we believe that the best potential for growth in the short-term lies with stationary systems that provide back-up power for offices and other commercial properties. We anticipate that demand for such systems is likely to continue to grow, but, these are likely to remain the only commercially viable systems—at least in the short-term.

Transportation

We are less sanguine about the prospects for fuel-cell use in the automotive sector, believing that we are far from realizing the dream of a fleet of hydrogen-powered vehicles. To date there are only a handful of hydrogen fuelling stations in operation — four in Germany, two in California, two in Japan and one in Iceland. For hydrogen-powered cars to be accepted by the public, the consensus is that 15-20 percent of filling stations will need to provide hydrogen.[26] This could take another 5-10 years to achieve. Moreover, while hydrogen-powered buses drive on city streets in nine European cities as well as a handful of North American and Japanese cities,[27] the first fuel-cell vehicle to be leased to a member of the general public will cost about $1 million, versus a 10 percent surcharge on the price of a regular vehicle for a hybrid vehicle.[28]

[23] *Beyond Oil,* Kenneth S. Deffeyes, 2005, p. 157
[24] Siemens website, 10/31/05
[25] *The Financial Times*, 08/18/05
[26] www.feasta.org, 08/18/05
[27] "Future Power," *National Geographic*, 8/05
[28] Honda press release, 06/29/05

To put some additional context around demand for hydrogen-powered vehicles, their biggest competitor in the near-term is likely to come from hybrid (gas-electric powered) vehicles. Unlike hydrogen-powered vehicles, hybrid vehicles are priced comparably to gas-only powered vehicles, and already are gaining widespread acceptance in the consumer automotive market. However, hybrids face their own challenges—in the U.S., they are expected to account for only 20 percent of the total car market in five years.[29]

China, a market with strong growth potential for the automotive industry, is also beginning to look at hybrid technology. Nevertheless, production at Volkswagen's Chinese venture will not begin until 2008, while large-scale production is not slated to start until 2010.[30]

Hydrogen-powered vehicles also face potential competition from the biomass segment of the energy industry, specifically ethanol. We will go into more detail about the growth of the use of ethanol as an automotive fuel in the biomass section of this report, but, like hybrids, ethanol-powered vehicles are an established technology that faces fewer hurdles to acceptance than those powered by hydrogen.

Based on today's hydrogen market penetration and other considerations, we believe that large-scale adoption of hydrogen as an energy source, other than in stationary systems where the reliability of the energy source is more important than cost, is still at least half a decade away if not longer. Potential stymies include:

- The high cost of fuel cells themselves.
- The major investment in infrastructure needed in hydrogen-supply networks and distribution systems.
- In hydrogen-powered vehicles, liquid hydrogen tends to boil off while the vehicle is parked for longer periods of time.

At the end of the day, the speed at which a hydrogen economy comes into being is likely to depend on the continued high prices of fossil fuels and their stability of supply, combined with the success of other alternatives in displacing oil as an energy source. Rapid growth in alternative energy sources, combined with increasing demand for hybrid vehicles, may reduce the demand for traditional fossil fuels to such an extent that they diminish the urgency to transition toward a hydrogen economy.

Biomass

Biomass refers to plant matter, such as plants, trees, grasses, agricultural crops, and animal manure. Currently the most economical type of biomass for generating energy comes from residues, organic byproducts of food, fiber and forestry including sawdust, rice husks, wheat straw, corn stalks and bagasse (sugar cane residue). Chicken manure is also becoming an important fuel for generating electricity from biomass.

These types of fuels can convert into energy-heat, electricity-using technologies similar to those used to convert fossil fuels. Biomass fuels burn to generate heat, which is converted to mechanical energy using either a steam or gas turbine. Biomass can also be converted into fuel that can either replace or reduce the emissions of fossil fuels.

Biomass Electricity Generation

There are some 200 producers of biomass power product in the U.S. alone. The majority — more than two-thirds — use forest products, and just under one-third use landfill gas as the primary fuel source. In some cases, especially where the cost of biomass is very low, it is co-fired with a fossil fuel, such as coal, to lower the overall cost of the electricity produced. As an added benefit, biomass electricity generation can help earn emissions' credits, as adding biomass to the mix helps to reduce the sulfur dioxide and nitrogen oxides that are a typical byproduct of a coal-fired power station. Currently, co-firing is the most economical form of electricity generation using biomass and, after adapting the plant for the inclusion of biomass in the fuel mix, can have payback periods of as low as two years.[31]

In addition to co-firing, there are three other types of biomass electricity-generation systems: direct-fired, gasification, and modular. Of these, the most commonly used is direct-fired. In this system, biomass fuel is burned in a boiler to produce high-pressure steam, which then drives turbines to produce electricity. The drawback to these types of power plants is that they tend to be small scale and are not very efficient. Costs also tend to be relatively high, at nine cents per kilowatt-hour, versus only 2.1 cents per kilowatt-hour for some co-fired plants.[31]

In contrast, gasification systems are far more efficient, reaching 60 percent, versus only 20-40 percent for some direct-fired plants.[31] These types of systems heat the biomass in an environment where the solid biomass breaks down into a flammable gas, such as methane. This gas can then be used in more efficient combined-cycle power-generation systems

[29] *Christian Science Monitor*, 5/05
[30] Reuters, 09/08/05
[31] U.S. Department of Energy, 10/30/05

that use both gas and steam turbines to generate electricity. Such systems may be used in conjunction with fuel-cell systems in the future. With the introduction of new technologies, costs may even prove competitive with natural gas-powered plants at five cents per kilowatt-hour.

Modular systems use similar technologies to the above but on a localized scale. For example, they are used to power industrial plants in the pulp and paper industry.

Biomass as a Substitute Fuel Source

Use of biomass, such as ethanol and biodiesel, as a fuel is increasing dramatically in the U.S. and abroad. Both fuels can be blended with gasoline or diesel to make them cleaner-burning to reduce emissions or as a direct substitute. In recent years, ethanol use has been rising quickly in the U.S. as a result of the desire to reduce automotive emissions and problems with the fuel additive MTBE, which was previously added to gasoline to help reduce emissions. In parts of the Midwest, for example, ethanol accounts for 10 percent of the gasoline mix, the maximum that regular gas-fueled cars can use, with states such as Minnesota and Iowa mandating higher future usage.[32]

Responding to this trend, Ford recently announced that it would be stepping up production of ethanol cars for both the U.S. and European markets.[33] Brazil is the leader in using ethanol as an automotive fuel source, with ethanol accounting for 50 percent of automotive fuel.[34] During the oil shock of the early 1980s, Brazil began to convert some of its automotive fleet to ethanol, producing flex-fuel vehicles. As oil prices have shot up in 2005, so has demand for these vehicles, which now account for 40 percent of sales.[35] Moreover, the Brazilians are beginning to think about producing these vehicles for export.

Demand for biodiesel, which is made by transforming vegetable oil with alcohol, is also growing. Biodiesel is the only fuel that does not require the purchase of a new or especially adapted vehicle. Europe is the largest market, helped by significant penetration of diesel-fueled cars. Germany alone uses about 450 million gallons of biodiesel a year — three percent of its total diesel consumption.[34]

Outlook

Looking forward, it is possible that fast-growing energy crops, along with animal manure, may become the biomass fuels of choice. In terms of the former, such crops will need to be fast growing, drought-resistant and easy to harvest to maintain competitive prices. For example, crops such as switchgrass, a plant native to the North American prairies that grows faster and needs less fertilizer than other crops, is fast becoming the major source of ethanol.

As an alternative fuel to generate electricity, the source of the biomass — a paper mill, sawmill or sugar mill — needs to be less than 100 miles from the power plant to be economical. There are clear signs that the idea of biomass as an alternative source of electricity is gaining traction, especially in countries with no established electricity grid, and the need for cheap, locally distributed power. For example, a Chinese conglomerate, Yasheng Group, purchased an 80 percent stake in Montana-based Sustainable Systems LLC, a developer of bio-refineries and bio-based fuels.

Even in developed countries with established grids, the notion of bio-based electricity generation is gaining some momentum outside the obvious cost benefits to co-fired plants. Examples include the recent establishment of power-generating plants in Scotland and New England that are fuelled by chicken manure.

Biomass is increasingly recognized as a realistic alternative to fossil fuels in automotive use. With its flex-fuel car, Brazil is obviously at the forefront of this trend, but other countries are following its lead. China is exploring the use of bio-fuels in its rapidly expanding automotive sector. Meanwhile, Europe's large diesel-powered automotive fleet has its advantages. As mentioned earlier, existing diesel combustion engines do not need any special adaptation to burn biodiesel. JD Powers and Associates estimates that 50 percent of Europe's cars and trucks will run on diesel rather than gasoline in 2005/06.[36] If oil prices remain relatively high, we may see rapid growth in the use of biodiesel within Europe.

Nevertheless, there are some drawbacks to large-scale bio-fuel development. Growing fuel to provide electricity and fuel for our cars — rather than extracting as we do with fossil fuels — is likely to require a lot of land. New crops may help, but biomass is more likely to prove a complement than a substitute for other fuel sources in the long run. Moreover, its increased usage in the developed world is more likely to prove sustainable over the longer term if the current trend away from the national grid system of power toward distributed energy continues.

[32] *Columbus Business Journal*, 09/20/05
[33] *St. Petersburg Times*, 10/17/05
[34] "Future Power: Where Will the World Get Its Next Energy Fix?" *National Geographic*, 8/05
[35] "Where Do You Get Your Energy from? Latest on Alternative Liquid Fuels," *Energy Bulletin*, 10/03/05
[36] Reuters, 05/30/05

Distributed Energy: Increasing the Attractiveness of Alternatives

The massive blackout across the northeastern United States in August 2003 did much to focus attention on the problems of the electrical grid structure in the U.S. It served to increase interest in different ways of looking at electricity transmission, including providing the grid with storage capacity and distributed energy; that is, localized energy production and distribution. Such localized power production may ultimately encourage swifter adoption of alternative energy sources.

Energy Storage

Storage of electricity through conversion to another fuel is expensive. Nevertheless, higher initial costs are typically offset over the longer term due to the efficiencies storage promotes. Storage also provides flexibility through the peaks and troughs in demand, as well as supply.

To deal with fluctuations in demand, energy storage is most commonly used in conjunction with nuclear power. Nuclear plants need to operate flat out, which often means that excess electricity is generated overnight. If a nuclear plant is paired with a hydroelectric plant, and the surplus energy generated during trough demand is used to pump water back up behind the hydroelectric dam, this energy can be stored and released as hydroelectric power during peak demand periods.

One of the criticisms often leveled at alternative energy sources such as wind and solar power is that they are intermittent in nature. Using wind or solar energy to generate hydrogen converts these types of energy sources into other fuels, helping to bridge the gap when, for instance, the wind is not blowing or the sun is not shining.

Symbiotic pairs include:

- Coal plus oil field for carbon storage
- Nuclear plus hydroelectric
- Wind/solar plus hydrogen production

Distributed Energy

In the developed world, energy distribution is trending toward smaller, more locally based electricity generation for the first time since the 1970s. This trend is driven by the need for super-reliable, high-quality power, especially for sites such as data centers and high-technology parks, as well as hospitals and police stations. As technology has become the norm in the work place, the need for extra reliability in power provision has risen. When the power goes out, even for a short period, losses can mount up through the hundreds of thousands of dollars. Reflecting this trend, the U.S. Department of Energy estimates that about 20 percent of new electricity generation capacity will be distributed by the end of this decade.[37]

Developing countries' needs are slightly different. The tendency toward distributed power is driven by the necessity to provide relatively cheap and reliable power in the absence of a developed electricity grid. Such grids are expensive to build and maintain, combined with their other downside — the loss of electricity during transmission.

On a localized basis, on-site electricity generation could lead to significantly higher energy efficiency, which translates to cost savings for the residential consumer. This is because a significant amount of electricity is wasted when it is distributed through power lines from a central power plant to the home. We believe that the full potential of distributed energy is likely to be achieved through integration with the overall power network. Such smart networks that also include storage potential are likely to help open up niches where distributed energy is more competitive, helping to reduce costs and break down market barriers for generation technologies such as solar power and fuel cells.

Utilities such as Pacific Gas & Electric and Ontario Hydro Energy are pioneers in smart distributed-energy networks. Both already have uncovered major savings' potential as a result of using localized energy production rather than having to spend on traditional grid investments. It is probably no surprise that both also are leaders in the use of alternative-energy sources.

[37] Department of Energy, 12/05

How to Invest in the Alternative Energy Market

Investors interested in allocating some of their assets to alternative energy have a number of options spread across three tiers of opportunity. First, there are large established conglomerates that have divisions that operate in well-established growth markets, such as nuclear, hydroelectric and wind energy. There also are smaller publicly listed companies developing energy technologies, such as biomass, solar and fuel cells. Third, there are privately held, non-listed companies developing experimental technologies, such as nanotechnology-based solar panels.

Large Companies in Established Alternative-Energy Technologies

Many investors may already have exposure to alternative-energy companies in their investment portfolios without realizing it. For example, General Electric became a world leader in solar power this year when it took over AstroPower, adding to its position as a key player in the wind-turbine industry and providing equipment for the nuclear industry. The company announced earlier this year that it hoped to double its revenues by 2010 through the sale of environmentally cleaner technologies.[38]

Other such companies include industrial conglomerate United Technologies, which has a fuel-cell division, and oil companies BP and Royal Dutch Shell, which have alternative-energy divisions as they position themselves as truly diversified energy providers. The drawback to gaining exposure to alternative energy through such companies, however, is that the alternative energy divisions of these companies tend to be relatively small versus their core businesses. As a result, the impact that any rapid growth in demand for alternative energy may have on company profits is likely to be diluted by other divisions of these companies.

There are companies that offer purer plays in certain industries, specifically wind and solar energy. These include Vesta of Denmark and Gamesa of Spain in the wind-power industry, and Massachusetts-based Evergreen Solar in the solar sector. Stock prices for such companies often already reflect expected rapid rates of growth in these sectors of the energy market. If you are considering such an investment, you should consult your investment professional to determine whether it is a good time to purchase such a stock.

PowerShares WilderHill Clean Energy: An Example of an Alternative Energy ETF

Managed by PowerShares Capital Management, the PowerShares WilderHill Clean Energy ETF (ticker symbol PBW), tracks the WilderHill Clean Energy Index (ECO), a portfolio that, as of November 2005, holds 37 companies listed in the U.S. These companies specialize in the production of green energy, such as wind, solar, and hydrogen-fuel cells. The fund invests at least 80 percent of its total assets in common stocks of clean energy and conservation companies.

Small Publicly Listed Companies

The attraction of investing in a young company in an industry that has the potential to grow rapidly is that you may hit the jackpot. You could pick the future industry leader, the equivalent of Microsoft or eBay. But, as many of us sadly learned during the dot.com boom and bust, finding the ultimate winner is no easy task. For example, PlugPower, a manufacturer of fuel cells designed to generate electricity, and Ballard Power Systems, a company that focuses on developing fuel cells for the automotive industry, may look attractive from a technology and market-positioning point of view. Upon further research, however, the stocks of both have been highly volatile since their public listings, suggesting that such stocks are not suitable for many investors and, if you are prepared to take on the additional risk, they should be considered only for the riskiest portion of your portfolio.

Another option in this less-developed, riskier space is to purchase a portfolio of stocks through an investment in a mutual fund, closed-end fund, exchange traded fund (ETF) or, if suitable for your specific circumstances, through an experienced investment manager who specializes in socially responsible investing (SRI). Adopting pooled investment strategies offers the potential for attractive returns if growth in the alternative-energy sector takes off, and may diversify away some of the risk to your portfolio of companies that may not survive in the longer-term. In addition, such investments have the ability to cushion disappointments in segments of the alternative-energy sector that have the potential to produce disappointing returns, given the long-term horizon of commercial viability.

Privately Held Start-Up Companies

The riskiest investments in the alternative-energy sector are the venture-funded, privately held start-up companies that often have unproven technologies but offer the potential for high returns, should these technologies prove successful. Venture capital investments in such companies rose by 21 percent in the first half of 2005.[38] Many of the top names in venture capital investing have funds dedicated to clean technology or significant investments in this field. The demand for such clean-energy funds is fuelled by large institutional investors.

How does the individual investor gain access to such funds? First, you need to be accredited: You and your spouse must have over $1 million in investable assets or earn more than $300,000 per year; if you are an unmarried individual, you must earn more than $200,000 per year.

If you meet those criteria, you also need to consider whether such investments are suitable for your particular needs and circumstances. Such funds may be riskier than investing in other vehicles and are typically illiquid, so you should not expect to realize returns for at least 10 years. Gaining entry into such a fund also may prove challenging. Because of these difficulties, we think that investing in an ETF or sector mutual fund may still represent the most attractive way in which to invest in alternatives.

To find out more about investment options in alternative energy and whether they are suitable for your individual circumstances, please contact your Private Client Services relationship manager.

[38] "Investment Soars in Alternative Energy," *Startup Journal, Wall Street Journal*, 11/3/05

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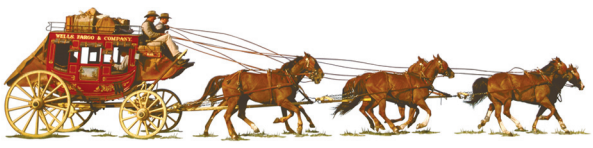

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