

:: Venture Capital and the Alternative Energy Industry :: Coal's Renaissance :::

This week's Observations cover venture capitalists' interest in the alternative energy industry, and the emergence of clean-coal technologies.

VENTURE CAPITAL AND THE ALTERNATIVE ENERGY INDUSTRY

Burgeoning energy demands and improved technology are making the alternative energy industry attractive to venture capitalists again. After years of disappointing returns from alternative energy assets, and an overall slump in investment activity during the late 1990s, venture capital firms are pouring money into alternative energy -- a sector constituting a tiny fraction of the trillion-dollar energy industry. The newfound sizzle in alternative energy is that it is finally becoming an integral part of the larger energy industry, which has relatively inelastic demand. The energy industry consistently grows by 2% - 3% per year despite skyrocketing fuel prices.

The Newest Sustainable Fuel: Dollar Bills

The alternative energy industry has burned through capital for decades. In the 1970s, President Jimmy Carter touted synthetic-fuel projects to help the U.S. deal with high gasoline prices and an oil embargo; the projects failed. The U.S. Energy Department then invested heavily in solar technology, but commercial viability waned, and in the 1980s the government's funding for solar technology fell. The solar energy surge gave way in the 1990s to a hunt for cold-fusion technology, which proved elusive.

U.S. venture capital investments in the industry used to be relatively small, totaling \$90 million from 1990 to 1995. As the alternative energy technologies developed, so did the venture capital investments, growing to over \$3.3 billion during the period 1997-2001. Investments peaked in 2000 at \$1.5 billion, when the average investment in a company surpassed \$20 million. U.S. energy investments fell the next two years -- by over 40% in 2001 and by another 45% in 2002. U.S. investments remained flat in 2002-2004, at less 500 million a year.

But venture capital remained on the table, and global venture capital investments in alternative energy began to rise -- from \$1.085 billion in 2002, to \$1.169 billion in 2003, to \$1.209 billion in 2004. Despite the massive dollar amount, alternative energy companies received just 5.8% of venture capital invested in 2004.

Domestically, despite the flat investment levels, venture capitalists began allocating larger

percentages of their investments to the energy sector: in 1998, energy projects received just 1% of all venture capital investments; in 2004, they received 2.6%.

Investment Trends

In the past, venture capital firms invested in alternative energy companies knowing it would take years or decades before products came to market or cash flows turned positive. These days, alternative energy companies are more focused on making existing energy systems cleaner, faster, more reliable, or cheaper. That's why Nth Power Technologies, JP Morgan, Draper Fisher Jurveston, and other major alternative energy investors are more attracted to today's business models. Technologies that come to market sooner also produce returns sooner. This may explain the increase in the average size of a U.S. venture capital investment in energy, from \$6.8 million in 2003 to \$8 million in 2004 -- still a far cry from the \$20 million per investment during the peak year of 2000.

Several segments of the alternative energy industry are attracting special attention from investors. One heavily funded segment is fuel cells, because fuel cells could one day be used to power cars, computers, phones, and the other mobile devices demanded by an increasingly wireless society. Fuel cell and battery companies together received \$277 million of venture capital in 2003, compared with just \$64 million in 1999. Hydrogen infrastructure development is also gaining attention; a fuel-cell market will require systems to produce hydrogen fuel cells, hydrogen plants, and hydrogen fueling stations.

Other alternative energies are also popular. Biomass fuels, such as ethanol, methane gas, and biodiesel, are the U.S.'s fastest-growing alternative energy source. The fuels have received considerable funding since federal and local government agencies began using them. Biomass fuels are gaining ground internationally, too: they are expected to constitute 5.75% of Europe's fuel market by 2010. Solar technology is also receiving funding again. Advances in technology are making solar panels and photovoltaic cells smaller, cheaper, and more efficient, and solar energy use is expanding worldwide by 40% annually, and at a slower rate in the United States. Other popular venture capital investment areas include green building construction, nanotechnology, power-grid management, and efficiency technologies.

Motivating Factors

Despite decades of failed and marginal investments, there are several reasons why the financial promise of the alternative energy industry may finally be realized. The biggest reason is that technological improvements have lowered production costs and thus dramatically raised the commercial feasibility of many alternative energy products. Business savvy has also entered the picture. Venture capitalists have learned through their failures what to look for in modern alternative energy companies. Additionally, experienced CEOs and other corporate managers are migrating to the industry, providing entrepreneurs with business acumen, regulatory knowledge, and credibility in the investment community.

The alternative energy industry is also receiving substantially more public support than ever before. Energy issues have become more pressing due to continued forecasts of declines in oil supply, political instability in the Middle East and other energy-exporting areas, environmental concerns, and health issues associated with traditional-energy use. As a

result, local and federal efforts have aided, and in some cases required, the growth of the alternative energy industry. Although Congress has not passed legislation to limit oil imports, it has committed billions of dollars to alternative energy research, development, and tax breaks. Also, over a dozen states have passed laws requiring that a minimum percentage of energy come from renewable sources over the next several years (see <u>Observations</u>, <u>June 8</u>, 2005). The growing confidence in alternative energy has motivated several power utilities to become venture capitalists themselves in order to counter the threat of competition.

Outside the venture capital sector, demand is increasing for environmental investment opportunities. In 2004, the California Public Employees' Retirement System, one of the nation's largest investment funds, reported that it would allocate \$700 million to the alternative energy sector over several years, either through environmental mutual funds or through the actions of environmentally-focused fund managers.

Increased availability of capital creates opportunities for more alternative energy ventures and brings liquidity to the market, making it easier for existing companies to grow. Risks are inherent in the alternative energy industry, including delayed product releases, limited profits, and management challenges. To mitigate the risks, some investors are exploring established companies with alternative energy divisions, such as Toyota or General Electric.

There are reasons to believe that venture capital investments in the alternative energy industry could be more lucrative than ever. Although an increasing demand for energy and a falling supply of easily extractable oil promises opportunities for research and invention, only the potential for profit will attract enough capital to finally sustain the sustainable.

COAL'S RENAISSANCE

By 2015, the U.S. will need approximately 50,000 megawatts of new electrical generating capacity, and by 2025, it will require at least 281 gigawatts of electricity annually. Yet at the current time, all available nuclear and hydroelectric plants are operating at full capacity, most oil is being produced in politically unstable nations, and alternative energy technologies are still undergoing development. But coal is abundant and readily available. With new clean-coal technologies available, coal may be the best bet for meeting U.S. energy needs.

Coming Clean

Three major energy users -- the U.S., China, and India -- have proposed a total of 850 new coal plants, which could generate up to 327,000 megawatts of electricity by 2012. More than 100 of the new coal-fired power plants are planned for the U.S.; these plants could supply enough power for 60 million homes. This potential bodes well for coal producers, especially those that can deliver high-heat, low-sulfur coal like that from the Powder River Basin in Wyoming.

Coal's primary disadvantage is that burning it causes pollution. Coal still carries the dirty reputation it acquired during the Industrial Revolution. Coal-fired plants are currently responsible for 60% of U.S. sulfur dioxide emissions, 22% of U.S. mercury emissions, 25% of nitrogen oxide emissions, and more than 33% of the nation's carbon dioxide emissions.

Some of the older coal-fired power plants have scrubbers and emission-control systems, but those systems only remove sulfur and ash from the coal plant exhaust; all other emissions rise into the atmosphere, and can settle on the ground or in open water. The EPA has estimated that if all coal-fired power plants reduced their emissions by at least 75%, approximately 20,000 premature deaths could be avoided each year.

The technology to reduce emissions is already available. What are called "clean-coal" technologies actually clean the coal. Clean-coal technologies can remove the harmful compounds from the coal before it is burned -- cleaning the coal enough to reduce up to 90% of the emissions produced by traditional coal-burning plants. The new technologies also include cost-effective and practical ways to remove most of the carbon dioxide emissions for subsequent storage underground, a process called carbon sequestration. Although carbon dioxide is not classified as a pollutant, it is widely considered a major contributor to global climate change. Opponents to coal-fired plants say that if just 72 new plants are built in the United States, without clean-coal technologies, the emissions would wipe out half the progress expected from the efforts to comply with the Kyoto Protocol.

Brand New All Over Again

Coal currently supplies 51% of the electrical power generated in the United States. The U.S. holds 25% of the world's coal reserves, and the energy content of those reserves exceeds that of all the world's known recoverable oil. Geologists estimate that the U.S. has enough coal to last at least another 250 years at current use levels. Yet in the last 10 years, only about 2.5% of the new electrical-generation capacity in the U.S. has been coal-fired. During this decade-long slump, coal has been vilified for its polluting qualities. But coal is now considered by many industry experts as the "it" fuel for electricity production.

Coal has advantages over most of its competition. Natural gas, for example, has significantly lower emissions and lower plant construction costs, but natural gas's position as a favored fossil fuel is being shaken by skyrocketing prices. Although a gas-fired plant is cheaper to build than a coal-fired plant, coal is cheaper in the long run. Other alternative sources, such as wind, solar energy, geothermal power, and biomass, are gaining ground, but they're still inadequate as large-scale sources of electricity in the immediate future (see <u>Observations</u>, <u>June 8</u>, 2005). And of course, there is the nuclear option. Nuclear power could satisfy demand on a large scale, but it still faces many challenges before acceptance by the general public (see <u>Observations</u>, <u>May 18</u>, 2005).

What's it Going to Take?

Even those who oppose coal-fired plants agree that coal is easy to find, easy to burn, and available nearly everywhere. As the U.S. has the world's largest reserves of coal, it seems that any plan to address the future of energy in the U.S. needs to begin with coal. Because the commercial development of clean-coal technology is projected to take less than 10 years in contrast to the twenty-plus years required to develop renewable energy technologies, coal is getting the bulk of the federal government's \$250 million in annual clean-energy subsidies.

The Bush administration has proposed increasing the funding for clean-coal initiatives in its 2005 budget, including a \$1 billion "FutureGen" program that would use public and private

money to construct the world's first zero-emissions coal-fired plant. The clean-coal technology for this effort creates pure hydrogen for use in combustion and in fuel cells and sequesters all of the carbon dioxide released from burning the coal. Although President Bush wants the technology perfected within 10 years, it is still in the early stages.

Even if the zero-emissions plant is successful, the hardest part may be getting the utilities to use the technology. Utility companies are powerful and conservative. Change is expensive and risky, and utilities have no incentive to innovate. The technology's primary long-term advantage -- controlling greenhouse gas emissions -- is not a big concern to many utilities because the U.S. does not yet regulate carbon dioxide emissions, and neither do China and India.

Utilities are also concerned about cost. State-of-the-art clean-coal plants are about 25% - 30% more expensive than conventional coal-fired plants with emissions controls. Even advocates of clean-coal systems admit that clean-coal technology needs to become cheaper and more efficient.

Coal's Future

It appears that for the large-scale expansion of electricity generation capacity, the two realistic choices are coal or nuclear power, and coal is an immediate solution. The supply of coal is abundant, domestic, and secure. Coal is cheap, and clean-coal technologies are emerging that will make coal a cleaner source of energy. The U.S. can apply the technologies to provide needed power and to reduce dependence on foreign sources of energy.

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