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Wind Power: Outlook Bright

BY ELLEN PFEIFER

Wind power looks like a storm advancing on the horizon.

The fastest growing energy technology in the world, wind power blew 3800 megawatts (MW) of new utility-scale capacity online during 2000, according to the American Wind Energy Association (AWEA). In the United States, 53 MW of new projects were installed, and several new facilities totaling 2000 MW were set to spin their turbines by the end of 2001. Somewhat behind the rest of the world, the US already derives 1% of its electric power from wind, with the Department of Energy setting a conservative goal of 5% by 2020.

Of course, wind's environmental virtues are well known: it operates on a free, abundant natural resource. It pollutes neither air nor water. Indeed, unlike nearly every other form of fuel, it uses no water at all. Because of technological refinements and economies of scale, the price of wind has dropped almost 90% in the last two decades. According to the AWEA, it is now cheaper than natural gas and becoming increasingly competitive with coal and nuclear power.

So, if wind has such gale force potential, why hasn't it caught on even faster — particularly in the United States?

It's a complex question. Integrating wind energy — or any renewable — into the US utility grid is fraught with technological interface issues and public policy questions. Some

Please see WIND POWER page 4

FEATURED COMPANY

NEG Micon: Wind at Work

BY CHANNING PAGE

RANDERS, DENMARK— WHAT HAPPENS IF YOU ARE ONE OF THE FASTEST GROWING COMPANIES IN A FAST MOVING INDUSTRY AND YOU TAKE A WRONG TURN? IF YOU ARE NEG MICON, YOU MAKE A QUICK ADJUSTMENT AND HEAD BACK INTO THE FAST LANE. THE COMEBACK KID OF THE WIND INDUSTRY, NEG MICON PRODUCES TURBINES THAT COMMANDED A 14% SHARE OF THE GLOBAL MARKET IN 2000.

However, this was a decline from its 19% market share in 1999. In fact, the company nearly went bankrupt in 1999. That year, it lost DKK 630 Million (nearly $76 million), the result of excessively fast growth (including eight acquisitions in 1998) and the failure of a key component, the Flender gearboxes. With new management at the helm, NEG Micon has subsequently focused on rebuilding the credibility of its brand, investing in research, and developing a business strategy better adapted to the growth and change in the market.

The Danes in the Forefront

Like most of the industry leaders, NEG Micon is a Danish company, the Danes having gotten a jump on the rest of the world by creating the first wind generator in 1890.

These windmills don't resemble anything you would recognize from a fairytale or travel brochure. Today's turbines are sleek, aerodynamic machines built of fiberglass and using sophisticated computer technology. Often standing 40-60 meters high (the size of a 13-20 story building), these space-age giants dwarf their ancestors, not only in stature, but also in their efficiency and power. Current models have an average capacity of 1000 kW (1 MW) and produce between two and three million kilowatt hours of electricity a year, about the consumption of 500-800 European homes. With greater engineering refinements, the weight of these turbines has halved in the last five years and their sound levels halved in three years while their energy output has increased 100-fold in 15 years.

Please see NEG MICON page 3

Insuring Against the Perfect Storm

JACKSON W. ROBINSON

Will climate change eviscerate the Property and Casualty (P&C) insurance companies? The forecast is not promising.

As we enter the 2001 hurricane season, London-based Tropical Storm Risk is projecting a 20-30% increase this year in tropical storms and hurricanes in the U.S. This would set a new seven-year record. While not singling out global warming as the culprit, Tropical Storm Risk bases its storm warnings on above-average water temperatures and moderating Trade Winds in the Atlantic. Both conditions are exacerbated by the greenhouse effect.

According to the Lawrence Berkeley National Laboratory, annual weather-related insurance losses in the U.S. from major events have already escalated to $9.2 billion/year in the 1990's, more than 14 times 1960's losses (when adjusted for inflation). If the storm prognosticators are correct, the future promises to be especially painful for P&C insurance companies and their shareholders in spite of stiff increases in weather-related premiums.

Weather Damage and Stock Declines

To better understand the recent impact of major storms on Property and Casualty company shareholders, Winslow researcher Celine Suarez created a consolidated, equally weighted stock index of the leading, public U.S. P&C companies (see chart). Limiting the index to companies whose P&C premiums represent more than 50% of their total revenues, she identified three leading firms: Allstate Insurance Company (NYSE:ALL), CNA Financial Corp. (NYSE:CNA), and St. Paul Companies, Inc. (NYSE:SPC).

Suarez then pinpointed eight storms (see table) in the U.S. over the last seven years that resulted in $1 billion or more of weather-related damages and plotted each on the Winslow P&C stock index. Immediately following each major storm, the leading P&C stocks declined. The biggest single drop of -24% occurred after the summer of 1999 drought and heat wave that ravaged the South resulting in losses of $6-9 billion. The smallest decline of -5% followed the January 1999 ice storms in the Northeast with $1 billion in damage claims. The average storm-related price decline for the eight storms was -14%.

Other Industries At Risk

The increasing trend in the number and severity of weather-related P&C losses will affect other industries. For example, many banks and life insurance companies have huge portfolios of loans and mortgages that are secured by real estate. To the extent the quality

Please see MARKETBEAT page 3

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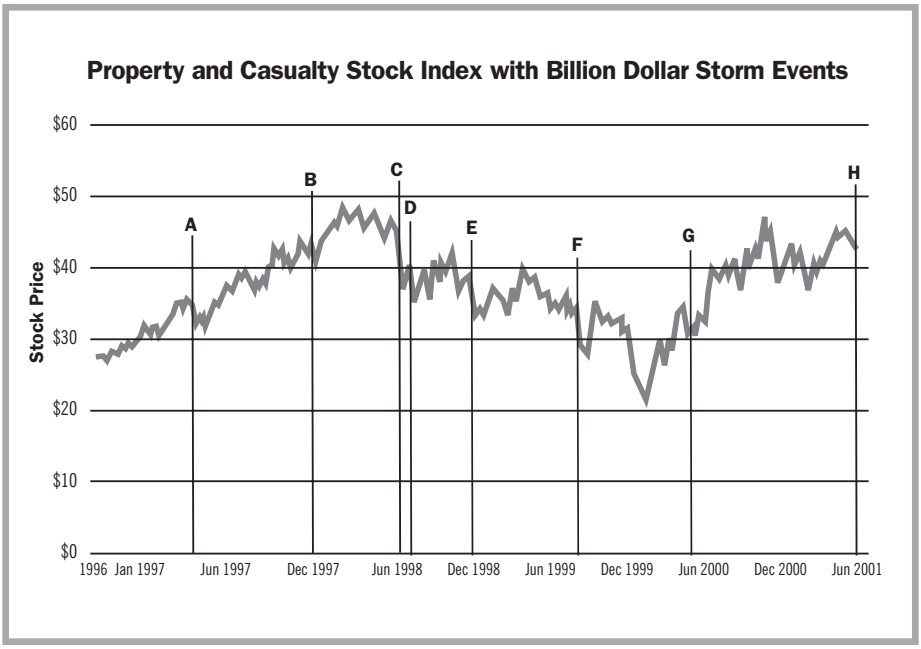

MARKETBEAT Continued from page 2

and quantity of their real estate collateral is damaged, destroyed, or under-insured, their financial health will be compromised. Clearly they too are not immune from the weather-related changes in our environment.

The economic implications of climate change are far ranging and just beginning to be understood and appreciated by corporate America. While it certainly makes good investment sense to avoid P&C companies, the rising trend in weather-related catastrophes are occurring throughout the country and are sure to reach far beyond financial services companies.

Billion Dollar Storm Events

A	March 1, 1997, Mississippi and Ohio Valleys: tornadoes & heavy rainfall, $1 billion
B	January 1998, Northeast and Canada: ice storm, $1 billion
C	June-August 1998, South, U.S.: drought & heat wave, $6-9 billion
D	August 26, 1998, Southeast, U.S.: Hurricane Bonnie, $1 billion
E	January 1999, Arkansas and Tennessee: tornadoes, $1.3 billion
F	September 7-17, 1999, Southeast, U.S.: Hurricane Floyd, $6 billion
G	June-July, 2000, South and West, U.S.: summer drought/fire season, $6 billion
H	June 2001, Texas and Louisiana: Tropical Storm Allison, $5 billion

Source: National Ocean and Atmospheric Administration, www.ncdc.noaa.gov/ol/reports/billionz.html
Federal Emergency Management Agency: www.fema.gov/nwz00/wthr0127.htm

NEG MICON Continued from page 1

Constant Research and Development

Among the challenges to turbine designers has been how to manage the unpredictable changes in speed and direction inherent in wind. Traditionally, NEG Micon was known for its "stall regulation" technology, a turbine design that allows the blades to turn at a constant rate, despite changes in the wind speed. In recent years, however, the market has embraced a new technology — "pitch regulation" — in which the blades adjust their angle to the wind to ensure that they do not turn too fast. Some companies have proceeded further, developing turbines whose blades turn not at a constant rate, but at variable speeds. At present, assorted combinations of stall regulation, pitch regulation, constant rate, and variable speed technologies are being employed to produce turbines suited to different weather conditions at different sites.

Seeing the competition advance, NEG Micon increased its investment in R&D spending from nearly $10 million in 1999 to over $13 million in 2000. The company has now developed all four technologies, and is improving the efficiencies of its turbines while increasing their size.

Another distinctive feature of the business is that NEG Micon manufactures its own blades, towers, and software control systems. It believes this level of vertical integration provides a competitive advantage over its peers.

For example, according to Chief Financial Officer Per Hornung Pedersen, NEG Micon's 750 kW turbine is now being replaced in the portfolio by a 900 kW turbine which produces 18% more electricity and yet costs only 9% more to manufacture.

Strong Competitors

If the United States extends the Production Tax Credit this fall, the American market will

Please see NEG MICON page 5

WIND POWER Continued from page 1

of these hurdles have been cleared, but many remain.

Interface Issues

Wind is an intermittent energy source. Turbines spin only when the wind blows. And it hasn't been easy for wind farm operators to predict when the zephyrs would waft their way. Conventional utilities, accustomed to dealing with the special requirements of coal, gas, and other fossil fuels, have been less flexible in dealing with the exigencies of wind.

Certainly, technological advances have made wind increasingly competitive in the market. But, the apparent cheapness of conventional fossil fuels is belied by their damage to the environment.

"Utilities are not known for their creativity," says Richard Kennelly, energy project director of the Conservation Law Foundation. "They're a stodgy old-boy network that has always done things a certain way." So, if a wind generator was scheduled to transmit a certain amount of power at a given day and time and the wind didn't blow, the generator would be penalized — whether or not the default resulted in a power shortfall. Possible solutions include more last-minute scheduling, fines imposed only in the case of real power shortfalls, and the dispersion of windmills in more distant clusters to take advantage of varying winds.

Wind plants, particularly those employing early generation equipment, have also produced electricity that was not reliably compatible with the grid in terms of voltage regulation, power fluctuations, and harmonics (distortion of voltage and current waveforms). However, the refinement of wind turbine technology has led to variable speed capability and onboard computerized controls that can now regulate output within acceptable limits.

Public Policy Issues

Because renewable fuels have historically been more expensive than traditional fossil fuels, utilities have needed incentives, both regulatory and economic, to adopt them into their mix. One significant inducement is the mandating of Renewable Portfolio Standards (RPS).

Now law in 14 states, an RPS generally stipulates a certain percentage of a utility's electric power that must come from renewables. Further, an RPS may level the playing field for renewables by banning certain utility business practices that discriminate against green power. So, for example, in Texas, the state RPS required the development of 2000 MW of new, renewable power by 2009. It also established so-called "postage stamp" transmission rates so that wind generators, typically located in remote areas, would not have to pay piggybacked fees for long distance distribution. It also allowed for the building of new transmission facilities for renewable energy with the costs spread out over the entire rate base. (*Whole Earth*, Summer 2001).

However, some states have adopted wind energy even without the incentive of an RPS. UtiliCorp of Kansas has "chosen to develop 100 MW of wind power on the basis of economics", says Edgar DiMeo, of the power systems engineering consulting company, Electrotek Concepts. "The alternative was natural gas and we all know what has happened to the cost of natural gas. Wind won out over natural gas because it was cheaper."

Another thorny area is the old Not-in-My-Back-Yard issue. Not everyone wants a wind farm or new transmission lines obstructing their view. Kennelly points to the controversy on Nantucket Island, Massachusetts, where some residents and conservationists are opposing the creation of a massive wind farm in Nantucket Sound. Proposed by the newly formed Cape Wind Company, the facility would be built in a shallow section of the sound, five miles from Hyannis and seven miles northeast of Nantucket. Some conservationists worry about the farm's impact on marine life, while some residents worry they will have their pristine views disturbed — concerns Kennelly believes may be exaggerated.

Interestingly, though, many farmers in the Midwest would be happy to rent out space for windmills. "On the quarter acre footprint required by a single turbine, a farmer could bring in $2000 year in revenue. Growing corn on the same size plot, he could earn maybe $200," Kennelly said. "The turbines don't interfere with his farming. And the wind companies are happy because the fields are already clear cut and located not too distant from utility load centers."

Wind's True Costs May Clinch the Deal

If wind's current growth is still somewhat dependent on subsidies and regulatory intervention, "it won't always be," Kennelly insists. Certainly, technological advances have made wind increasingly competitive in the market. But, the apparent cheapness of conventional fossil fuels is belied by their damage to the environment. "We don't factor in the full cost of things," Kennelly says. "What is the true societal cost of a coal-fired plant? If a plant spews out 10 pounds of mercury a year, that seemingly small amount is enough to kill thousands of fish. And there are over 60,000 children born each year with measurable brain damage from mercury that their mothers ingested from eating contaminated fish. So how valuable is your child's brain?"

With no pollution of atmosphere or water, with an energy source that is ever available and free, wind power is starting to look like a better deal all the time.

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Robinson Chairs Panel at AH&H Summer Seminar

Fuel cell-powered cars are probably the wave of the future, but there are likely to be a variety of hybrid-electric vehicles flooding the market in the near term. And, don't discount the ability of combustion-engine vehicles to adapt and survive, to become more efficient and less polluting by incorporating "mild hybrid" electronic systems into their design. That was the consensus of a panel on "Emerging Technologies for the Transportation Industry" chaired by Jack Robinson, President of Winslow Management Company. The discussion took place during the 21st Annual Summer Seminar presented by Adams, Harkness & Hill, July 31 – August 2 at Boston's Marriott Long Wharf Hotel.

Robinson led a lively discussion among four knowledgeable and outspoken leaders in the field including: Robert Stempel, Chairman, Energy Conversion Devices, Inc.; Alan Niedzwiecki, Executive Director, Business Development, Quantum Technologies; Paul Lancaster, Chief Financial Officer, Ballard Power Systems; and William Rankin, Chairman and CEO, UQM Technologies.

Growing interest: some farmers are finding that harvesting the wind is more profitable than traditional crops

NEG MICON Continued from page 3

offer the greatest opportunities, followed by Spain and Germany. However, NEG Micon faces stiff competition in the United States, particularly from the world's largest wind turbine company, a Danish neighbor, Vestas Wind Systems. Compounding the challenge, NEG Micon must recover from the 1999 gearbox fiasco. So damaging was the situation that NEG Micon's share of the U.S. market dropped from 32% in 1999 to 2% in 2000. Nonetheless it expects that its improving reputation will lead to greater results in 2001 and thereafter.

Under negotiation now is a wind farm to be built at the Nevada Test Site, where the U.S. Department of Energy has historically tested nuclear weapons. Siemens Automation & Technology will join with M&N Windpower (a subsidiary of NEG Micon) to develop a generating facility that will eventually produce as much as 260 MW. In the first 85-MW phase, the project will use 120 NEG Micon turbines. If the full 260 MW project is built, 325 NEG Micon turbines would be installed.

Beyond Turbines

NEG Micon differs from its competitors in creating its own development program. As with the Nevada Test Site project, the company sometimes pursues opportunities through this subsidiary. By contrast, most other turbine manufacturers eschew development work altogether, arguing that they ought not to compete with their customers.

Another distinctive feature of the business is that NEG Micon manufactures its own blades, towers, and software control systems. It believes this level of vertical integration provides a competitive advantage over its peers.

Whether that advantage is real is still an open question. But the overall consensus is that NEG Micon is back. The wind energy market is large enough and growing quickly enough to accommodate all the major manufacturers of turbines. It is now just a question of how the pie will be divided.

PORTFOLIO UPDATE

FuelCell Energy, Inc. (NASDAQ: FCEL)

DANBURY, CT — On July 26, FuelCell Energy announced the shipment of a 250-kilowatt Direct FuelCell®, (DFC®,) power plant to the Los Angeles Department of Water and Power (LADWP). Direct FuelCells, generate combustion-free energy from hydrogen sources such as natural gas. Essentially, they behave like large continuously operating batteries run on a fuel supply. Because they don't burn fuel, they do not produce emissions. The site for this power plant will be the downtown LADWP headquarters, where the generator will supply energy and demonstrate the environmental benefits and capabilities of DFC distributed power generation.

FuelCell Energy's delivery of the power plant represents the next step in the company's progress toward commercialization. The first of its kind in the field, the new unit will allow FuelCell Energy and LADWP to collect operating data and on-site experience for future endeavors. This and other projects in the pipeline will aid the commercial launch of FuelCell's products later this year.

AstroPower, Inc. (NASDAQ: APWR)

NEWARK, DE — AstroPower has announced that it will acquire the Spanish company Atersa, a leading manufacturer of solar electric power modules and balance-of-system components. Atersa also supplies system design and integration services, and designs and builds a wide range of module manufacturing equipment. For about $21.1 million in stock and cash, APWR will acquire Atersa's 50% equity stake in AstraSolar, a joint solar cell manufacturing venture by APWR and Atersa in Spain. As a result, Atersa shareholders will receive 58% of the total consideration in cash and about 42% in APWR shares. This acquisition is part of APWR's strategy to expand its geographical reach and product offerings.

In other news, GPU Solar, Inc., a joint venture between APWR and GPU, Inc, announced that California Governor Gray Davis selected PowerLight Corporation's factory in Berkeley, CA for a press conference in which he endorsed plans to increase renewable energy generation. Located on the roof of this facility is GPU Solar's 100-kilowatt solar-electric power plant. Power from the Berkeley plant is provided to California residents via Green Mountain Energy Company. Financing is supported in part by funding from the California Energy Commission, the City of Palo Alto, and the U.S. Department of Energy through an award from the Solar Electric Power Association. Homebuilders in California have also realized the value of solar electricity generation, and APWR has recently partnered with leading builders in California to make solar electric power a standard feature in newly constructed homes.

York Research Corp. (NASDAQ: YORK)

NEW YORK, NY — At the Shareholders Annual Meeting in late July, York announced its intention to develop a 620 MW power generation facility in Yuma County, AZ. This facility will be a natural gas-fired, combined-cycle power plant supplemented by York's patented SEECOT™ solar energy technology. The SEECOT™ system utilizes solar energy to increase power output during peak summer months. Because it displaces fossil fuel use, it increases the plant's competitiveness.

York also announced an agreement in which the Dominican Republic Government has executed a payment guarantee for power to be delivered under a 30-year purchase agreement with the nation's power utility, Corporacion Dominicana de Electricidad. York is developing the 115MW wind power project to be built in Puerto Plata; initial service is intended to begin next year. When complete, this facility will provide a minimum of 340 million kilowatt hours of electricity per year.

Conceptus, Inc. (NASDAQ: CPTS)

SAN CARLOS, CA — In mid-July, Conceptus announced the new name for it's non-surgical permanent birth control procedure. Formerly STOP, it is now called Essure pbc (pronounced "assure"). The new name has been highly rated by women who say it communicates an image of assurance, femininity, and safety.

Recently, CPTS announced the results of its pivotal trial for Essure pbc in which 92 percent of employed women returned to work one day or less after insertion of the device. Further results indicate that nearly 60 percent of Essure pbc patients were back to regular physical activities within one day and 76 percent within two days. Other data showed that 95 percent of patients would recommend the procedure to friends, and 99 percent of women relying on Essure pbc as their primary contraceptive rated their long-term satisfaction as 'good' to 'excellent'. To date, there has not been a pregnancy with Essure pbc. During the pivotal trial, Essure was not directly compared to tubal ligation. However, an upcoming trial will do so in an effort to substantiate CPTS's marketing claims.

Currently, CPTS has trained 40 physicians throughout Australia where Essure pbc is being rolled out for commercial introduction. It is expected that this number will increase to 90 by year-end. Early in the quarter, Essure pbc was approved for use in Singapore, an estimated market of $2.6 million. Currently, CPTS has one site running in Singapore, and is expected to have 3-4 sites by end Q3.