Renewables Prosper, Propelled By Regulatory Push, Financial Pull

*By Fereidoon P. Sioshansi**

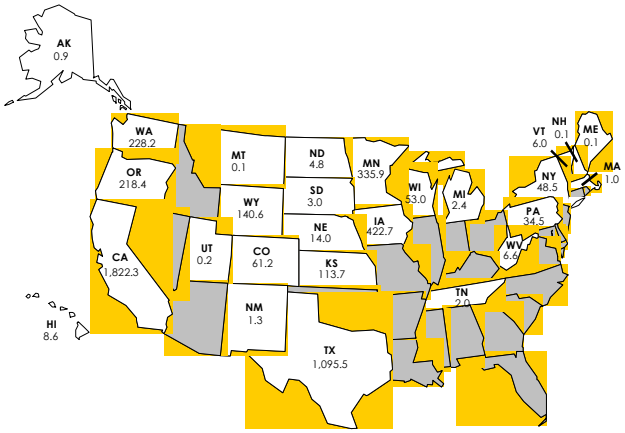
One of the few bright spots in the otherwise depressed generation business in North America and Europe is renewables. Pushed by government mandates and state requirements, and pulled by lucrative subsidies, tax credits, and financial incentives, they are making inroads everywhere — but notably, in Europe — and making a comeback in the Unites States.

Other countries, developing as well as developed, are also warming up to the potential of renewables. In many developing countries, distributed generation (DG), which includes many renewable installations, is making rapid inroads. Constantly improving technology and falling prices are helping the economics of renewables and DG. The environmentalists, who typically do not favor large central stations, tend to be fond of renewables.

In the United States, renewable portfolio standards provide the necessary push, while tax credits offer a strong pull. Thirteen states currently have such standards, which provide a mandated goal and deadline. Not surprisingly, there has been a surge of interest in renewables, with wind as the dominant contributor. According to the American Wind Energy Association , there are now 4,685 MW of installed wind capacity in the Unites States, with California, Texas and Iowa as the top three states.

In the U.S. Renewables Are Mandated through Portfolio Standards

States with renewable portfolio standards



Source: American Wind Energy Association.

But other renewables are also benefiting. Calpine Corporation, for example, recently signed a contract for 200 MW of geothermal energy with Southern California Edison Company. The contract, which has received the blessing of the California Public Utilities Commission, is to begin delivery of power by the end of the second quarter of 2003. Calpine is the world's largest geothermal power generator, with 19 facilities in the geysers area of Northern California.

Dollars Are Flowing In The Wind

Installed wind capacity in the U.S., January 2003

Source: American Wind Energy Association (AWEA).

Internationally, wind energy has been a big winner. The worldwide installed wind capacity at the end of 2002 is estimated around 30,000 MW, and is expected to grow significantly in the next decade.

There are rosy predictions of growth for distributed generation as well, especially in developing countries where the transmission systems do not adequately serve rural populations. A study by the World Alliance for Decentralized Energy, for example, predicts that, with supportive government policies, DG can potentially grow to 100GW by 2010, exceeding that of centralized generation. China is currently the world leader in DG, providing an estimated 15% of its electricity needs through *decentralized energy*, which must mean not connected to the national network. DG has strong proponents in developing countries as well.

In the UK, long considered a laggard within the European Union, things have taken a turn for the better for renewables. In February 2003, Tony Blair's government released its long-awaited Energy White Paper, which set highly ambitious goals for reducing greenhouse gas emissions to be accomplished, in part, by adding considerable amounts of renewable energy. The new policy sets a goal of reducing UK's carbon emissions by 60% by 2050, and doubling the share of renewables to 20% by 2020.

Prime Minister Blair gave his blessings to the scheme, but his Environment Secretary, Ms. Margaret Beckett, was more cautious, calling the targets " … demanding and stretching." There is some speculation on the vague wording of the document and what it really says. Some read the goals as *ambitions* that may or may not be achieved. This suspicion is strengthened by a lack of specificity in the document. Everybody agrees that achieving these goals would be hard, if not impossible, and will take sustained commitment, as well as funds. The CO_2 reduction goal, for example, does not appear realistic in the absence of more nuclear energy.

As might be expected, Britain's recently released policy statement has been vague and highly controversial. Environmental groups were generally pleased, especially since the government appears to want to reduce carbon emissions by increasing the reliance on renewables and through efficiency improvements, rather than increasing the share of nuclear energy. But even they criticized the government for not

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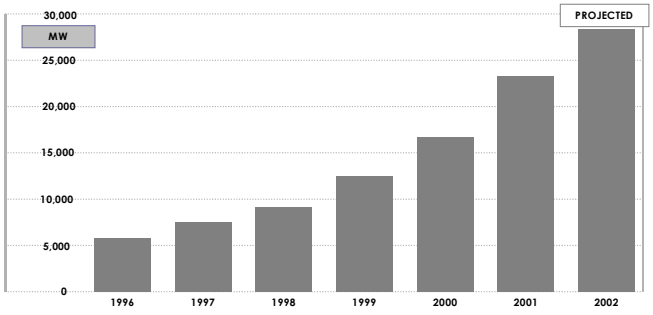
committing to specific targets. The Institute for Public Policy Research, for example, warned that the " … White Paper is chronically short on detail."

Wind Energy: Global Growth Industry
Worldwide installed wind capacity; MW



Source: American Wind Energy Association

Nuclear proponents, as might be expected, cried foul, pointing out some of the inconsistencies in government policies. Sir Bernard Ingham, who is the Secretary of the Supporters of Nuclear Energy, a lobbying group, for example, characterized the government's paper as "incompetent, irrelevant, and frankly dangerous." He said, "At a time when greenhouse emissions are rising in Britain, it [the White Paper] proposes to continue to allow the nuclear industry, which emits no greenhouse gases, to run down. Wind power is not only seriously intermittent, it is also seriously expensive."

Given these favorable government policies, it is not surprising that investors are catching on.

A recently released report by Clean Edge, a San Francisco-based market research firm, concludes that renewable energy technologies are becoming increasingly attractive to investors, now accounting for 2.3% of total investments by venture capitalists. That may not sound like much, but represents a significant growth from a mere 0.7% only three years ago.

The Clean Edge report, in part reads, "While most industries, especially the technology sector, are seeing sluggish or negative growth, many clean-energy technologies are experiencing double-digit annual growth rates," The report goes on to say: "We believe that solar power, wind power, and fuel cells will continue to exhibit aggressive annual growth for the foreseeable future."

The report projects that renewable energy will become an $89 billion industry by 2012, up from just under $10 billion now. It forecasts that spending on photovoltaics will grow from $3.5 billion to $27.5 billion, wind power investment will increase from $5.5 billion to $49 billion, and investment in fuel cells will climb from $500 million to $12.5 billion by 2012.

The reasons for the growing popularity of renewables may be traced to many factors including:

- **Regulatory mandates**. A number of U.S. states and the European Union (EU) have set highly ambitious targets for renewables for the next decade.

An EU directive, for example, has set a goal of 22% for green electricity in Europe's energy mix by 2010, and has mandated an investment of 165 million euros in renewable energy resources. Great Britain's recently published White Paper aims to reduce the country's carbon emissions by 60% by 2050, mostly through renewables and energy efficiency. To achieve this goal, the UK has to generate 30%–40% of its electricity from renewables. The current level is 1.3%. California, Texas, Massachusetts, and a number of other states, have aggressive mandates which will push the development of renewables, mostly wind, for the rest of the decade.

- **Financial subsidies**. Many countries have special financial incentives to subsidize renewable technologies.

These vary in form and function. For example, tax credits in the United States, research and development funding by governments, etc., in different countries but the effect is to make renewables compete with less expensive conventional technologies.

- **Environmental edge**. Renewables are non-polluting, although they are not necessarily environmentally benign.

This gives them an edge over conventional technologies, especially if carbon taxes come to pass as a reality in the years to come. Environmentally-conscious consumers have indicated their willingness to pay a premium for so-called *green energy*, another factor contributing to the growth of renewable technologies.

- **Improved technology**. Wind and solar technologies have seen tremendous improvements in the past two decades, making them more reliable, requiring less maintenance, and generally offering higher output per unit of investment.
- **Falling costs**. The costs of most renewable technologies continue to fall, reducing the subsidy gap.

The Clean Edge report, for example, says that the price of solar energy has dropped significantly to $2.50/W, from $6/W only a decade ago. Over the next few years, solar energy costs are expected to come down further to $1/W for modules and $3/W fully installed, which amounts to 8¢–12¢/ kWh in generated electricity. Likewise, wind energy generation costs have come down to levels where they can compete with conventional electricity with little or no subsidies.

Taking these factors into account has emboldened investors who installed 6,886 MW of new wind capacity in 2002 alone: 5,871 MW of it in Europe. Corin Millais, the CEO of the European Wind Energy Association, is excited about the industry's prospects. The EU mandates, even assuming some slippage, will continue to push developments for years to come. He believes that global wind business will be worth 25 billion Euros by 2010, extrapolating current growth patterns.

Renewables are well-suited to the developing world for different reasons. Worldwide, there is currently 31 GW of installed wind capacity, growing at 32% annually in the past five years, according to the American Wind Energy Association. The major manufacturers, American and European, are gearing up to supply the needs of the growing industry.

General Electric, based in Fairfield, CT, sees big promise in wind power. It is injecting its corporate muscle into the still-evolving world of wind power. A year after the purchase of Enron's wind turbine business, the company expects GE Wind Energy to generate more than US$1 billion in revenue during 2003 and expand about 20% annually thereafter. GE is to supply 130 of its 3.6 MW turbines for a proposed 420 MW wind farm off the coast of Cape Cod in Massachusetts. If approved , certainly not an easy sell, it would be among the world's largest wind farms.