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SPAIN green energy


IVAN LEE STANFORD/IMAGES.COM

The Power and the Glory

Spain, a pioneer of wind power since the time of Don Quixote, is now basking in the limelight as a world leader in the development of alternative energy sources.

With investment in renewable energy racing ahead internationally, Spain has established itself as a frontrunner in the development of new sources of sustainable supplies and is beginning to reap the economic rewards.

"In the last few years, our need for renewable sources of energy has become a strategic opportunity," says Enrique Jiménez Larrea, director general of the Institute for Energy Diversification and Saving (IDAE), the government entity responsible for the development of sustainable sources of energy.

The Iberian nation is one of the world's three largest users of wind power with an installed capacity of 15,515 megawatts (MW) at the beginning of this year, accounting for almost 10% of the country's generation of electricity. This compares favorably with U.S. wind power capacity, which doubled last year to 16.8 gigawatts.

On particularly windy days in Spain, wind power exceeds all other sources of electricity.

Spain is also the fourth-largest manufacturer of solar power technology and has pioneered the development of biomass fuel, bioclimatic architecture and renewable energy grid integration. In the process, it has established a body of expertise in green energy.

What lies behind Spain's international prominence in renewable energies? With only minimal oil resources and a demand for energy that has doubled in recent years, the country has had more reason than most to pursue the hunt for green energy, and it has done so with considerable success.

Now, with oil prices rising, fossil fuels decreasing and concern over climate change growing, investment in sources of clean, renewable energy has become a particularly attractive option, and Spain's preeminence in the field is paying considerable dividends.

Global energy demand will grow almost 50% by 2030, according to the International Energy Agency, and massive investment is required to meet that demand. The market for electricity alone is estimated to be worth $8 trillion within the next 20 years.

New investment worldwide in renewable energy and energy efficiency was more than $148 billion last year, an increase of 60% over 2006 levels, according to a report prepared for the United Nations Environment Program (UNEP) by New Energy Finance.

Achim Steiner, head of UNEP, says the report showed that investors recognized that the transition to a low-carbon society was a global imperative, and this was resulting in an enormous inflow of capital, talent and technology. A total of $16.9 billion was invested in research and development of clean energy and energy efficiency.

Spain is at the forefront of this trend, both in terms of encouraging technological innovations in the search for clean energy sources and in introducing energy-saving efficiencies.

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Powerhouse of the Southern Mediterranean

Home to 420 multinationals, Valencia offers sporting, cultural and scientific events that make it an attractive place to live and invest.

PHOTOGRAPHERS CHOICE / IAN SANDERSON

The Valencia region is powering ahead as a leader in Spain's renewable-energy sector. The capital is the country's third-largest city, and the region itself lays claim to being the economic motor of the southern Mediterranean.

With more than 420 multinational companies operating within its borders, Valencia not only produces one-tenth of the country's GDP, but also is the leader of the pack in its drive to function economically through clean-energy production.

"We are already above the EU's standard in the use of clean energies and aim to achieve self-sufficiency in clean energy by 2012," says Antonio Lis Darder, director general of Valencia Community Investments, the region's promotional agency.

Valencia took full advantage of an incentive issued by the central government in Madrid that provided substantial subsidies to power generators that produced renewable energy. This resulted in foreign and Spanish companies collaborating to undertake a variety of solar- and wind-energy projects. For example, a photovoltaic energy park is being built in Villena, in neighboring Alicante, for which General Electric has provided most of the capital.

"New technological advances are minimizing the aesthetic of big photovoltaic energy towers," says Lis Darder. "We have also taken steps to ensure that energy efficiency does not detract from productivity."

Iberdrola, a Spanish company and the world's largest renewable-energy operator, plans to invest $1.4 billion in the region in the next two years.

Biomass is another renewable source of fuel that is being effectively exploited in Valencia, where research is intensely conducted toward the development of effective and commercially viable sources of biofuels.

Some innovative methods have been explored. In a recent project to illustrate the potential for food waste as a source of biofuel, 26.5 gallons a month of domestic oil waste were collected from commercial enterprises and used to produce an eco-diesel mix to drive the local buses.

Valencia's role as one of the world's top exporters of oranges has led some to consider another creative path. The idea would be to use the pulp and peel of a half-million oranges to produce an annual production of 37.5 million liters of bio-ethanol that could eventually power up to a quarter of Valencia's cars.

Such research has helped to enhance the region's profile as a pioneer of innovative clean-energy production, while

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The IDAE is responsible for overseeing both initiatives. A five-year renewable energies plan provides for the investment of approximately $34.4 million in grants in enterprises undertaking technological innovative projects.

The agency has a $43.9 million budget to provide potential investors with a line of loans to finance investments in solar-thermal, stand-alone photovoltaic and domestic biomass energy projects. A separate plan deals with energy-saving and efficiency measures.

Both plans focus on guaranteeing the supply of electricity and its security, respecting the environment and fulfilling Spain's commitment to international requirements.

"The role of the IDAE is to help private companies in the field of renewable energies," says Jiménez Larrea. "For the most innovative technologies, we work as an interface between the investigation and the commercial stage, when they may not seem as attractive to potential investors."

Such early funding is being provided, for example, for projects involving the development of marine energy from sea waves. "We are helping to launch seven or eight Spanish technologies that are carrying out various tests in this area," he says.

"IDAE not only sets the frame, it also has an investment line. We participate in projects such as new biomass plants and wind parks so that we can see the real operation of new technologies. We have to know the variables of all projects – from design to operation to maintenance – in order to evaluate costs and benefits for each technology and action line."

The IDAE liaises with the leading Spanish companies involved in the renewable energy sector and collaborates with international institutions that have a similar role to its own.

"We have seen that the U.S. government is very interested in what Spain is doing for this sector," says Jiménez Larrea. "This is of great importance to us. There are many Spanish companies operating in the U.S. which have nearly as many employees over there as they do here. It is a great combination."

At the moment, he says, many renewable-energy projects are not competitive,

> "We have seen that the U.S. government is very interested in what Spain is doing for this sector."
>
> *Enrique Jiménez Larrea, Director General, Institute for Energy*

various sporting, cultural and scientific events have promoted its attraction as an ideal place in which to live and invest.

Valencia has become one of the world's most-visited cities because of sporting events such as Formula One and the America's Cup. Tourists continue to be drawn by the appeal of its futuristic City of Arts and Sciences, which was one of the most imaginative projects created eight years ago to mark the passing of the millennium.

Economically, Valencia outperforms other regions in Spain with GDP above the national average. Porcelain and cement production are important industries, says Lis Darder, but emerging sectors such as audio-visual and renewable-energy technologies are gaining in significance. So, too, is the logistical handling of freight goods in and out of the port of Valencia.

The port facilities are a significant attraction for investors. With 7.4 miles of quayside and nearly 1,500 acres of terminals, Valencia has become Spain's leading port for container trade.

Thanks to the services the region provides to investors – including grants, subsidies and project finance, as well as what Lis Darder describes as a flexible legal framework of regulations – Valencia is Spain's third-largest recipient of foreign direct investment. Around 80% of this comes from EU countries, and more than 7% from the U.S., which has 31 companies operating in the region. ❖

and IDAE's role is to help those industrial sectors to consolidate and reduce their costs. "We hope to reach a point where building a wind-power plant is cheaper than it will be to import petrol."

Spain's immediate objective is to reach 22,000 MW of installed wind-power capacity by 2010 and to meet the EU target of slashing carbon dioxide emissions by 20% by the year 2020. "I think we are going to make it," says Jiménez Larrea. ❖

By Michael Knipe

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COMPANY PROFILE

Spotlight on Leadership

CENER's role is to promote and motivate the technological development and use of renewable energies.

Spain's high standing in the field of advanced technological research into renewable energy was reinforced in September with the official opening of the Wind Institute at Sangüesa in the Navarra region of northern Spain.

The institute is equipped with an experimental park and a compound-materials laboratory for the development and testing of the metal blades of wind turbines.

"The infrastructure will be the only one of its kind in the world," says Juan Ormazábal Jordana, general manager of Spain's National Center for Renewable Energy (CENER).

It will further add to the Iberian nation's allure as a reliable target for investment in the rapidly expanding field of renewable-energy technology.

Innovative projects in this sector have become attractive investment opportunities because of legislation passed by the Madrid government with the aim of achieving 20% of national energy consumption from renewable sources by 2020. Reaching this target will require a great deal of investment from national and international sources.

Spain already ranks third in the world in terms of the energy it obtains from wind power, having an installed capacity of 15,000 MW that generates 10% of the electrical power the country uses.

CENER'S FUNDAMENTAL ASSET IS ITS INDEPENDENCE FROM BUSINESS AND INSTITUTIONAL SECTORS.

"The problem now is not how many kilowatts we are going to install, but how we are going to cope with the challenges that arise with respect to grid integration," says Ormazábal Jordana.

The country's leading role in the initiation and development of alternative energy sources is driven by its circumstances. Spain not only lacks any traditional energy sources of its own, but because of its remarkable economic expansion over the past two decades, its consumption of petroleum has increased by twice as much as the global rate.

CENER was created in 2002 to promote and motivate the technological development and use of renewable energies.

It has a secondary role, which is to operate as a private company by offering clients research projects, technology and knowledge about clean-energy transfer.

With a staff of 200 highly qualified professionals, the center conducts research initiatives and provides specialized

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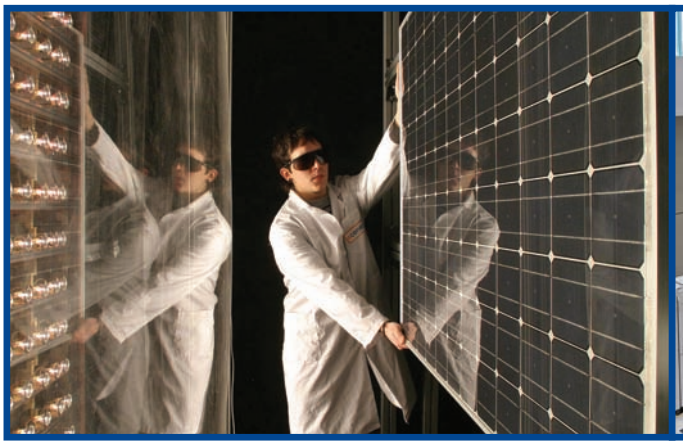

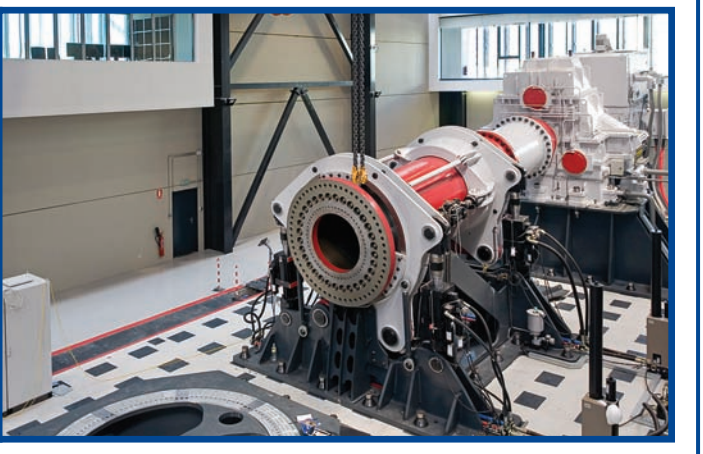

services in six areas of renewable energy: wind, solar-thermal, photovoltaic-solar, biomass, bioclimatic architecture and the energy grid integration of such renewable energies.

CENER functions as a national foundation with trustees drawn exclusively from public institutions. Its main asset, says Jerónimo Camacho Perea, general manager, strategic development and business, is its independence from business and institutional sectors.

It offers global multidisciplinary and coordinated consulting services to local and international investors in renewable-energy projects in all areas of operations: technological, strategic, financial, commercial, fiscal, legal, labor-related and environmental.

The risks are difficult to identify, however, because of the continual technological advances being made in alternative energy sources, the lack of experience many new investors have in such operations and the diversity of markets and regions. To counter this, says Camacho Perea, CENER offers potential investors analysis of the operation's due diligence procedures as well as an accurate valuation of possible investments.

Among CENER'S international collaborators are the University of Liverpool, the University of Grenoble, the National Meteorology Institute and the Higher Council of Associations of Architects of Spain.

Jerónimo Camacho Perea
Strategic Development & Business General Manager

CENER has a collaboration agreement with the U.S. National Renewable Energy Laboratory (NREL), through which both bodies will invest $1.5 million in the development of new technologies; and it has been contracted by the Australian government to implement a wind-prediction system. "We are working on five continents," says Ormazábal Jordana.

The most important projects CENER is currently undertaking, he adds, are those relating to wind generators and turbine-blade development. Future projects include a $43.8 million investment in second-generation biofuel development at an experimental plant that will process 500 kgs. of non-alimentary biomass per hour.

Juan Ormazábal Jordana
General Manager

Ormazábal Jordana says Spain does not have any special advantage in the field of renewable energy. "Leadership could have been acquired by any other country, but in Spain there have been huge industrial and business initiatives to profit from an opportunity.

"Traditional electric companies have invested in clean energies, and new companies, institutions and regions have placed a lot of emphasis on the development of the sector."

"LEADERSHIP COULD HAVE BEEN ACQUIRED BY ANY OTHER COUNTRY. BUT IN SPAIN THERE HAVE BEEN HUGE INDUSTRIAL AND BUSINESS INITIATIVES TO PROFIT FROM AN OPPORTUNITY."

Juan Ormazábal Jordana, General Manager, CENER

The race for renewable energy is leading to shortages of resources and a need to improve technology, he says. "We think there are many upcoming technologies in the sector, so to get a solid position in the market, companies need to have a solid technological base."

There is no magical solution to the problem of future energy supplies, says Ormazábal Jordana. "We have to assume that all resources are limited, and we have to have a social conception of our resources. We have to harmonize our thinking of how the world will be in a hundred years – and the changes that will have to be made."❖

www.cener.com

A Sunny Outlook

Cheaper silicon panels will make solar energy more competitive and cost-effective.

New methods of producing solar-grade polysilicon – an essential material for photovoltaic (PV) solar-power panels – are reducing its price and significantly boosting the market for this method of utilizing energy from the sun.

In recent years, the severe shortage of silicon has plagued the solar photovoltaic market. But with supplies no longer a constraint, the manufacture of silicon solar PV cells is expected to take off.

Analysts believe that it will be possible to make solar energy cost-competitive with conventional forms of energy by 2015, significantly reducing greenhouse gas emissions and dependence on fossil fuels.

One of the Spanish companies that will reap the benefit is Siliken, a renewable energy specialist that is building its own plant for the production of electronic-grade purified silicon in Albacete, which is in the autonomous community of Castile-La Mancha, 150 miles southeast of Madrid.

"Having our own silicon production facility will consolidate our position in the market," says Carlos Navarro, one of Siliken's founders and now the company's director general.

Since its creation in the Valencia region in 2001, Siliken has enjoyed an annual growth of more than 30% and now accounts for 13% of Spain's photovoltaic market. This year it opened a manufacturing plant in San Diego.

"We've also moved into Germany, Italy and France," says Navarro. "There are other exciting markets such as Greece, South Korea and Morocco where we believe it is possible to experience significant growth."

In the last financial year, Siliken had a turnover of $152 million and returned a profit of $8 million. It has increased its labor force from 65 to 600. One of the company's strengths is the emphasis it places on its own research and development.

"The machines that come off our production lines have been developed with our own technology," explains Navarro. "This has given us a lot of independence to grow and adapt to new trends in the market."

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>
> *Carlos Navarro, Director General, Siliken*

Although it began as a solar photovoltaic energy company and now manufactures and installs solar ingots, wafers, cells and modules, Siliken sees its future as an all-round renewable energy specialist and intends to move into other sectors such as wind energy.

"Our aim is to consolidate the company's status as an internationally recognized solutions provider in the renewable energy market, and to continue providing products that lead to greater self-sufficiency in terms of energy supplies and the reduction of the CO_2 emissions generated by other energy sources," says Navarro. ❖

Renaissance of a Region

The young once left in search of work. Now they are returning to a region revitalized by new technology and agriculture.

The world's largest photovoltaic energy plant was formally inaugurated in Extremadura in June 2008. Its construction illustrates the extent to which the renewable energy sector is revitalizing less-developed areas of Spain.

"Extremadura consumes only 1.7% of the energy used in Spain, but produces 7% of the country's total requirements and has the capacity to grow," says Guillermo Fernández Vara, the regional president.

The new plant at the Extremadura town of Abertura will produce 47,000 MW a year, enough to serve 22,570 homes, which is equivalent to a city the size of Mérida, the regional capital.

It is only one of many renewable-energy projects in development in the region. More than 130 photovoltaic projects are operational, and another 300 are in the process of being assessed.

The regional president says that Extremadura is attracting investment in both large and small solar-energy projects. "There are small facilities that provide energy to groups of people for their basic consumption – hot water, heating and electricity. Then there are the big projects involving foreign and local investment in 40- and 50-MW photovoltaic parks."

Adjoining Spain's western border with Portugal, Extremadura is one of the country's least-known tourist gems, and until recently, it was among the least-developed areas of the country.

In the past ten years, however, it has been overcoming a debilitating history of depopulation resulting from several generations of its young workers emigrating or leaving in search of employment.

Today, Extremadura is experiencing an economic renaissance, thanks to the potential of its renewable energy resources and its competitive agricultural products.

"Nowadays, the tomatoes that grow here are processed here. I call it the second transformation of Extremadura, in which we have taken advantage of the opportunities that we have now to compete with other regions," says Fernández Vara. "In the past decade, a lot of innovative development has taken place, especially in the area of information technology."

Extremadura, he points out, has four elements that enable it to be economically competitive: plenty of land suitable for development; substantial supplies of water; a willing labor force; and a huge potential in terms of renewable energy.

> "Extremadura consumes only 1.7% of the energy used in Spain, but produces 7% of the country's total requirements and has the capacity to grow."
>
> *Guillermo Fernández Vara, Regional President, Extremadura*

DIGITAL VISION

The region has a low-density population of 1 million, but its proximity to Portugal provides a surrounding market of 6 million potential consumers.

"We have political and social stability and reasonable salaries," says Fernández Vara. "Property prices and the cost of living are significantly below the Spanish average. These are the things that investors take into consideration."

In addition, the region has not been saturated with either business or property development. Indeed, a third of its territory is protected from such development. ❖

Spain Cuts Its Carbon Footprint

In the fight against climate change, legal limits are set to save energy on the roads and in public buildings.

IMAGE SOURCE PINK

The Spanish government has adopted drastic measures to save energy and meet its obligations under the 1997 Kyoto Protocol on climate change by the 2012 deadline.

Legally enforceable limits on thermostat settings have been imposed. Public buildings have been given a summer minimum of 26˚C (79˚F) for air-conditioned spaces and a winter maximum of 21˚C (70˚F) for heated spaces. Speed limits have also been cut by a fifth and street lighting by up to a half.

"The fight against climate change is an absolute priority for any responsible government in these times, and we cannot lose even a minute," says Prime Minister José Luis Rodriguez Zapatero.

Such measures were necessary because, until recently, Spain's need to catch up with its wealthier EU partners took political precedence over its need to reduce greenhouse gas emissions. As a result, the country's achievements in developing renewable-energy resources have been overshadowed by its less appealing status as the European nation emitting the most carbon dioxide.

However, government ministers point out that the country's greenhouse gas emissions need to be put into perspective. "Spain is the eighth-richest country in terms of GDP and the tenth-richest in terms of its greenhouse gas emissions. But it ranks 23rd in terms of emissions per capita," says Teresa Ribera, the secretary of state for climate change. "This shows that Spain is on the right path for the application of the Kyoto Protocol."

Of the richest countries, she says, Spain is the one that is maintaining the highest standards on a per-capita basis and that is making the biggest effort in comparison with the other industrialized countries within the EU.

Because of its relative lag in development compared with other EU member states and its need to catch up, Spain has been allowed a 15% increase in emissions above the 1990 level.

The government's efforts to save energy are in addition to the substantial subsidies it has effectively offered innovators over the past decade, which have enabled Spain to become a world leader in the development of green energy supplies. ❖