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Serpa Solar: a new era for Portugal's power mix ***02 April 2007***

With the dedication last week of GE's 11MW photovoltaic solar facility near Serpa, renewable power in Portugal is on the rise - writes John Kjorstad

This latest dawn of clean, sustainable energy has cast light on a number of promising technologies which strive to take advantage of the country's combination of wind, hydro, solar, wave and biomass resources.

Catalysed by a favourable government regime, ambitious targets to reach 45 per cent of electrical generation from renewable sources by 2010 and the involvement of big-ticket investors like GE Energy Financial Services, Portugal's renewable market seems set to emerge from the shadow of its Iberian neighbour Spain and stand among giants in the global renewable power sector.

Serpa Solar - the world's most productive PV plant



When GE initially invested US\$75 million in Serpa last spring, it was envisioned that the project would be the world's largest PV solar plant. However, that particular crown has already been passed on and is currently worn by the 12MW Gut Erlasse solar park in Germany. Not to be upstaged, GE found a new angle for Serpa based on the facility's projected productivity.

Despite being a lonely megawatt shy in capacity, one of the company's technical experts thought - based on irradiation data and Portugal's 3000 hours of sunshine per year - that the project site in Serpa, about 30km from Spain in the southeast part of Alentejo, would produce more power than Bavaria's Gut Erlasse. GE had the numbers independently confirmed and expect their facility to produce more than 20GWh per year.

'We are proud of that fact and proud to own this facility,' head of renewables for GE Energy Financial Services Kevin Walsh said at the dedication. 'We're so proud of this project that we featured it on several pages of GE's annual shareholder's report.'

To further prove the point, the project itself quietly set a new record for peak capacity on the same day as the dedication. While the press marvelled at the 52,000 PV modules spread across 150 acres of hills and farmland, a monitoring system on display in the event tent briefly registered a new peak as the facility hit 92 per cent capacity - the highest registered since the plant came online in late January.

For GE and the project's developers, the timing couldn't have been better. If the Portuguese weather is as reliable as it was at the dedication, Serpa will be able to provide enough peak power to supply the region - from Beja to Serpa - meeting the needs of nearly 8000 homes.

'The beauty of PV is that it distributes so well,' said Tom Dinwoodie from US-based PowerLight. '[11MW] is a very, very nice size for this project. You are able to achieve the economies of scale but you don't over produce for the region.'

Serpa uses a PowerLight technology called PowerTracker which follows the sun throughout the day to maximize efficiency. The project was advanced in 2004 by a strategic partnership between the green-tech firm and its original developer Catavento - a Portuguese company focused on the renewable energy sector.

Needing a capital injection to break ground on construction, the joint venture turned to GE.

GE Energy Financial Services has a dedicated team led by Walsh with a portfolio of about US\$1.8 billion invested in renewable energy. Overall, the team plans to invest US\$3 billion by the end of 2008.

With that kind of capital to spread, GE decided to buy 100 per cent of the Serpa project.

PowerLight and Catavento will continue to be involved at Serpa with the US firm tasked to operate and maintain the facility and the Portuguese company staying on board to provide management services.

Government incentives and ambitious targets

Serpa benefits from Portugal's feed-in-tariff for PV solar - which typically varies based on project size. The GE project will sell the electricity it generates for €0.31 (US\$0.41) per kWh.

Additionally, the project was awarded a €3.7 million (US\$4.9m) grant under the country's Economic Modernisation Program.

The tariff and grant are part of Portugal's move towards developing a more independent energy mix - which currently is dominated by imported natural gas.

Already this year, the government has revised its 2010 renewable power target - increasing it to the 45 per cent mark. Compared to European Union targets of 20 per cent by 2020, Portugal seems way ahead of the game and moving towards independence.

However, power consumption in the country has been rising 5 per cent per year over the last 10 years and meeting those targets does not represent a forgone conclusion.

Antonio Sa da Costa, president of Portugal's renewable energy association (APREN) told *IJ News* that to realistically meet increasing demand and the government's 45 per cent target, the country will have to do two things: increase its renewable power production and cut demand through efficiency.

Wind

Wind power is well established in Portugal and has been almost doubling in capacity annually for the past few years.

At the end of 2006, Portugal had 1716MW of installed capacity. Sa da Costa says there is slightly more than 1000MW under construction and about 5000MW which has been licensed and could be online by 2013. Furthermore, as in other European markets, financing wind projects has become an attractive business for banks - with the first closings back in 2005.

Last October, a group of four lenders, including Caixa Geral de Depositos and Millennium bcp, backed Portugal's biggest energy sector deal to date - an €806 million (US\$1.07bn) refinancing of Babcock & Brown's Martel wind portfolio.

Looking ahead, Caixa, Millennium bcp and Barclays are close to wrapping up the funding for a 250MW project in northern Portugal.

Furthermore, new round of government bidding is likely to finish soon with about 600MW to be developed. There is also a plan by ENERCON to build a turbine manufacturing facility in Portugal, which Sa da Costa said will add value - generating a more home-grown industry.

Finally, it's hard to ignore the influence of Portugal's utility EDP in the wind sector.

Last week, the Portuguese group made a play to get into the US market and bought American developer Horizon Wind Energy for US\$2.15 billion. The utility has gone from a local leader to a global giant in one fair swoop - making it one of the top five wind developers in the world.

On the home front, EDP has a large investment in Portugal's wind and hydro sectors - both in existing assets and projects currently under construction.

Hydro

A large chunk of Portugal's energy mix has been and will continue to be hydro-electric power - which is dependent on annual rain fall and Spanish management of rivers which flow into the country.

Currently, Portugal has about 5000MW of hydro that has been developed - covering about half of the country's potential. Sa da Costa says he would like to see at more of that potential developed.

However, building new hydro facilities in Portugal is a challenge.

'Essentially, the best spots are already covered and it's very difficult to develop new projects,' said Nuno Capucho, director of project finance at Caixa. 'Also, hydro is harder to implement by 2010.'

Last year still saw some big activity in the sector. Parallel to the Martel wind refinancing, Enersis - which is about 60 per cent owned by Spain's Endesa - refinanced a €180 million (US\$240.2m) mini-hydro portfolio with the same group of banks as the wind portfolio.

Looking ahead, EDP has at least two dam projects in the works ranging between 100 to 200MW.

Wave

While solar, wind and hydro all have commercial projects now in operation, Portugal's real energy potential lies offshore.

Every day waves come rolling in off the Atlantic - crashing on the country's 500km of western mainland coastline. Portugal's unique sea conditions - its continental shelf drops to 50-100 metres only three to six miles off the coast - make it difficult for offshore wind but ideal for wave power technologies.

Portugal has some natural advantages over Europe's other great wave spot - Scotland. Its swells are not as strong, storms not as big and Sa da Costa said 80 per cent of Portugal's electricity consumption occurs within 50km of coast. Also, getting power offshore and into the grid is supported by existing infrastructure near the shore.

One of the country's leading authorities on wave power, Teresa Pontes, has been researching the technology since 1983. She works for INETI in Portugal's Department of Renewable Energy.

Though not the first country to get a prototype in the water, Pontes said Portugal was the first to integrate a prototype (of national technology) into the grid - the Pico plant in the Azores islands. It will also be the first to launch a commercial project.

That project is being led by Enersis and involves the Scottish firm Ocean Power Delivery (OPD).

With an investment of about €9 million (US\$12m), Enersis and OPD plan to install three Pelamis devices totalling 2.5MW offshore north of Porto in northern Portugal.

The Pelamis is a snake like unit comprised of cylinders and linked by hinged joint. The apparatus rides 'head first' into waves and generates power using hydraulic motors via smoothing accumulators.

The project also benefits from a feed-in-tariff and will sell electricity into the grid for €0.24 (US\$0.32) per kWh.

The technology has impressed GE Energy Financial Services, which has made a 'small' investment in it.

According to Sa da Costa, the next phase of the project would be scaled up to 30 machines and generate 25MW.

Conclusion: a market on the move



On his way from Serpa to see the Pelamis in Peniche, GE's Andy Katell stopped to take a picture of an old Portuguese windmill with modern electrical turbines dotting the hillside behind it.

Natural renewable resources abound in Portugal, and that fact is not lost in its history. As technology develops and cost per kilowatt drops, the country has a golden opportunity to balance out its power mix with renewable energy.

Though his trip to Portugal was short, Katell said he was impressed by what he saw in the country - the strong wind market, the budding solar sector and seeds about to be planted in wave energy.

Already, Serpa has also opened the door for other PV solar facilities in Portugal - like the 62MW Moura plant which is likely to be project financed and is planned for the same region.

Outside of the PV sector, success developing thermal solar projects in Spain has some firms sniffing out similar opportunities in Portugal.

Paulo Caetano of Ecoprogresso oversees a €220 million (US\$293.7m) fund which has a balanced investment across the renewable spectrum. Part of his portfolio includes a proposed 25-50MW parabolic trough thermal solar project under development and currently at the licensing stage.

The buzz of opportunities seems to have reverberated across the Iberian Peninsula and into the collective ears of industry and finance.

'Solar is where wind was 10 years ago,' said Sergio Santos, director of project finance at Millenium bcp. 'What we have seen so far has been small.'
That may be, but it seems like it's about to get a whole lot bigger.

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