

Clue: A major city

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# Power in the desert: solar towers will harness sunshine of southern Spain

- Andalusia project will power 11,000 homes
- Technology exported to Morocco, Algeria and US

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This PS10 solar tower plant near Seville can generate 10MW of electricity. Photograph: Denis Doyle / Getty

In the desert of southern Spain, 20 miles outside Seville, more than 1,000 mirrors are being carefully positioned. Each is about half the size of a tennis court, so the adjustments will take time. But when they are complete in a few weeks, it will mark a major moment in the quest for renewable energy.

The mirrors are part of the world's biggest solar tower plant, a technology that reflects sunlight to superheat water at a central tower. Once this €80m (£67m) plant is inaugurated in January, it will generate 20MW of electricity, enough to power 11,000 Spanish homes.

Concentrated solar power (CSP) technology, as it is known, is seen by many as a simpler, cheaper and more efficient way to harness the sun's energy than other methods such as photovoltaic (PV) panels. But CSP only works in places with clear skies and strong sunshine.

The Andalusian deserts are an ideal location, and Spain hopes the PS20 plant will enable it to take advantage of its huge solar resource and lead the field in CSP technology.

"The radiation hitting the earth is 10,000 times the consumption of energy," said José Domínguez Abascal, chief technology officer at Abengoa, the Spanish energy company behind the plant. "There is great potential in solar energy."

Abengoa has already built a smaller version of the tower technology to test that the idea works. The 11MW PS10 system has been generating electricity for almost two years. Its

new design uses an area larger than 100 football pitches, with 1,255 mirrors, called heliostats, each with a collecting area of 120 sq m. These track the sun as it moves through the day and reflect the energy to the top of a 160-metre tower at the centre of the field. Here, the concentrated light is used to heat water to more than 1000C, producing steam that can turn an electricity generating turbine.

When switched on, the new plant will be the world's largest commercial CSP plant feeding electricity into a national grid. It will be also be a significant step for tower technology, seen as a candidate for the large-scale solar plants of the future.

Spanish firms are charging ahead with CSP: more than 50 solar projects around Spain have been approved for construction by the government and, by 2015, the country will generate more than 2GW of power from CSP, comfortably exceeding current national targets. The companies are also exporting their technology to Morocco, Algeria and the US.

"CSP is at the very beginning of a big boom," said José Luis García, at Greenpeace in Spain. "Spain is in a good position to develop and implement the technology. We have the sun so we are in the best position to lead in this field."

The country's clean energy targets are in line with the EU's plan to source 20% of primary energy from renewables by 2020, which means that 30% of electricity would have to come from carbon-free sources. A new EU renewables directive would increase that electricity target to 40%, but García said Spain could easily reach for more, up to 50%.

John Loughhead, executive director of the UK Energy Research Council, said that Abenoga's tower approach at the new plant was relatively efficient "because what you're doing is concentrating a very large area of sunlight on top of a very small area so you can get very high temperatures".

He added that, given the right environment, solar towers were a credible way to make clean power. "But can you make them cheap enough, will they be reliable enough, will they have the right lifetime?"

Another difficulty for potential developers is cost. In Spain, the generation costs of electricity from CSP are double those from more traditional methods. But Abascal said the price was falling as solar projects got bigger and it would match that of fossil fuel power within a decade.

For now, CSP projects across Spain are built with the promise that the government will pay a premium, known as a feed-in tariff, for any CSP electricity sent into the grid. The PS20 is part of a €1.2bn series of solar power plants based on CSP technologies including tower plants and trough-style collectors - where water is passed in tubes directly in front of parabolic mirrors that collect sunlight - and a few PV panels planned by Abengoa. The solar farm will eventually generate up to 300MW of power, enough for the 700,000 people of Seville, by 2013.

The 20MW solar tower is also a forerunner for an even more ambitious idea, one that Abascal hopes will become a standard for CSP plants in future - a 50MW version that could generate electricity around the clock. "During the day, you'd use 50% of your electricity to produce electricity and 50% to heat molten salt. During the night you use the molten salt to produce electricity."

Molten salt technology is in its early stages but Abengoa is testing the idea at a power plant in Granada. So far the company has demonstrated that it is possible to store up to eight hours of solar energy by heating tanks containing 28,000 tonnes of salt to more than 220C. "This will make it possible to have almost constant production or at least it will be able to produce energy for most of the day," said Abascal.

The European commission has identified CSP as part of its future clean energy technology plan. Earlier this year a representative from its joint research centre argued that CSP could even form a major part of a proposed EU supergrid that would transport electricity, generated in solar plants in southern Europe and northern Africa, across Europe.

The supergrid has received political support from Gordon Brown and France's president, Nicolas Sarkozy, who has commissioned a feasibility study on the project.

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### **Graveyard generation**

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The Spanish town of Santa Coloma de Gramenet has placed more than 450 solar panels on top of mausoleums at its cemetery to generate power, it emerged yesterday. The crowded, working-class town outside Barcelona decided that flat, open, sun-drenched land was so scarce that the graveyard was the only viable spot to site the panels, which provide enough electricity to power 60 homes. They rest on mausoleums holding five layers of coffins. The idea was a tough sell, said Antoni Fogue, a city council member. But town hall and cemetery officials waged a campaign to explain the project and the panels were erected at a low angle, to be as unobtrusive as possible. "This installation is compatible with respect for the deceased and for the families of the deceased," Fogue said.

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