Less expensive solar thermal power stations: "It is not the end of the development"

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Solar power plant in Morocco provides electricity for less than 15 euro cents per kilowatt hour

In Morocco, a group of companies led by Saudi Arabian ACWA Power International is going to build a power plant that will provide electricity for less than 15 euro cents per kilowatt hour. This amounts to much less than providers in Spain are currently paid for electricity generated at their solar power plants. Ulrich Wagner, Member of the DLR Executive Board responsible for Energy and Transport, explains why solar power plants are now able to produce less expensive electricity and why he anticipates further price reductions.

Question: Why is electricity from solar thermal power plants becoming less expensive at the moment?

Ulrich Wagner: When the construction boom for solar thermal power plants began in Spain back in 2007, companies needed the financial incentive of receiving almost 30 euro cents per kilowatt hour for electrical power before they would commit to investing in large projects with amounts of up to 300 million euro. This kind of project constituted a high-risk venture for these companies. The incentives, therefore, needed to be high. But the companies have now learned to quantify and limit those risks. Furthermore, all components in these power stations have been improved substantially with support from the world of research, and supply chains have been optimised. Then of course, there is the fact that sunlight in Morocco is available in larger - all of which helps to reduce costs. DLR studies have already shown that solar thermal power plants have the potential to generate electricity in a cost-effective manner. European manufacturers and the European Solar Thermal Electricity Association, ESTELA, are also assuming that, within the next few years, solar power plant operators will be able to offer electricity for 10 euro cents per kilowatt hour from good sites for solar power plants. What we see here is, to the best of our knowledge, an important step and by no means the end of a development leading to less expensive solar power prices.

Question: How are prices going to evolve?

Ulrich Wagner: The more power stations that are built, the faster and more steeply costs are going to drop. Moreover, many manufacturers are now preparing systems that can operate at higher temperatures and that are more efficient. They will, for example, require less mirror area to generate the same level of power, which will naturally reduce costs. At DLR, we are placing greater emphasis on tower power plants that operate at higher temperatures – reaching up to 1000 degrees Celsius - and that are therefore highly efficient. In addition, we are developing testing methods to enable power plant components, such as mirrors or receiver tubes, to be utilised much better. Encouraging signs suggest that, in the next 10 years, we may fall below the mark of 10 euro cents per kilowatt hour.

Question: We often hear the argument that electricity from photovoltaic systems is much less expensive.

Ulrich Wagner: It is perfectly correct to state that photovoltaic or solar power plants and solar thermal power plants both provide electricity, but the differences in quality are enormous: PV cells only generate power if the Sun is shining, whereas solar thermal power plants provide a controllable supply of renewable energy. This is due to the fact that these power plants are able to store solar power in the form of heat, and can do so for many hours at a time. When there is cloud cover, in the evenings and at night, a power plant of this kind is still able to supply

electricity to the grid as required. Solar power plants are therefore the only kind of power station capable of generating baseload regenerative and the value of this form of power is substantially higher for the network operator. In Morocco, for example, the power provider pays the local currency equivalent of eight euro cents per kilowatt hour for PV electricity, compared to 12 cents for controllable current from solar thermal power plants. At the end of the day, we need both of these technologies: solar power from PV cells in remote plants in the middle of the day and controllable solar energy from solar thermal power stations to cover weather-related shortfalls and the evening hours.

Question: How is DLR supporting the expansion of renewable forms of energy?

Ulrich Wagner: With our DESERTEC studies, we helped to pave the way in Morocco for a 'Solar Plan'. We still collaborate closely with the Moroccan Agency for Solar Energy, MASEN,and with IRESEN, the recently founded research institute for renewable energies. Among other things, DLR has helped to determine and quantify the availability of solar radiation resources. DLR employees were also involved in monitoring the construction of the first solar thermal power plant to enter service, located at Ain Beni Matar, in the north of Morocco. We also train technical specialists in Morocco and in other countries in the region as part of our 'enerMEN' training courses.

Question: German industry is a technological leader in the field of solar thermal power plants. What is the extent of involvement in projects of this kind?

Ulrich Wagner: That varies. At a power plant in Egypt, the engineering, mirrors, absorber tubes and the turbine come from Germany. This constitutes more than half of the total supplied parts. In Morocco, the proportion of German products is lower. This is due to a strong Spanish presence. Our commitment to DLR should of course assist German companies in positioning themselves better here.

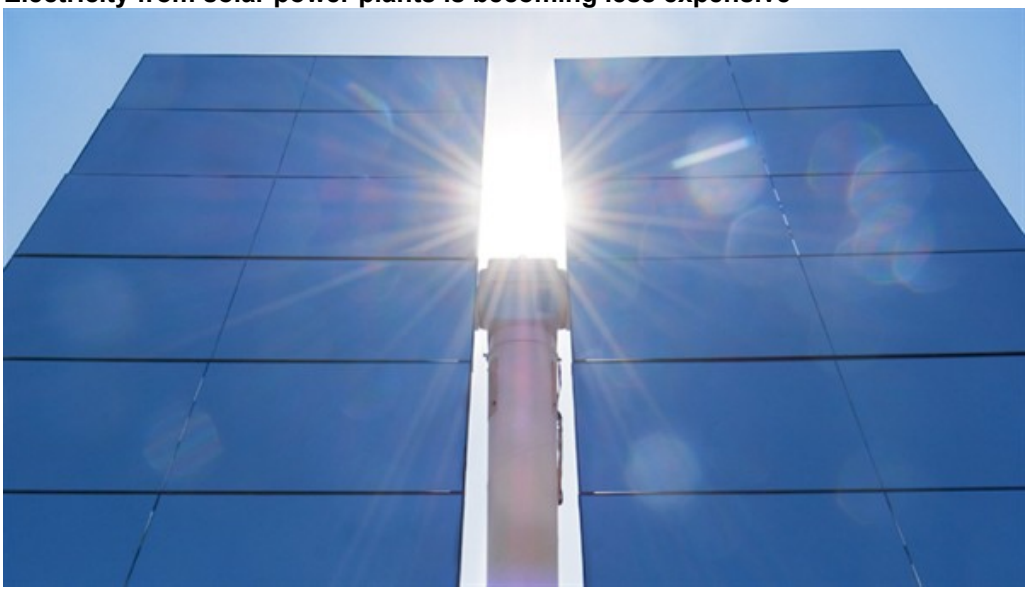
Question: How do you see the future development of solar thermal power stations?

Ulrich Wagner: Numerous countries in the 'Sun Belt' - north and south of the Equator - have shown great interest in these solar power plants, as they have the capacity to generate important base load and fully controllable power. DLR is therefore conducting intensive research into further technological developments - particularly into energy storage systems and into 'energy meteorology', to provide more dependable forecasts for generating electricity using solar and wind power. The combination of these research topics leads to a substantial improvement in efficiency, in costs and, last but not least, in reliability.

Contacts

Dorothee Bürkle
German Aerospace Center (DLR)
Media Relations, Energy and Transport Research
Tel.: +49 2203 601-3492
Fax: +49 2203 601-3249
Dorothee.Buerkle@dlr.de

Electricity from solar power plants is becoming less expensive



The Sun behind the heliostat of a tower power plant. When operating the power plant, the mirrors on many heliostats direct sunlight to the tip of a tower where temperatures of up to 1000 degrees Celsius are generated. Electricity is produced via a turbine and a generator. Tower power plants operate at higher temperatures, which helps to make electricity generation more efficient.

Credit: DLR/Markus Steur.

"In the next 10 years, solar thermal power stations are probably going to break through the 10 cents per kilowatt hour mark"

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