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Solar-bio-hybrid gas turbine deployed successfully for the first time in Almería

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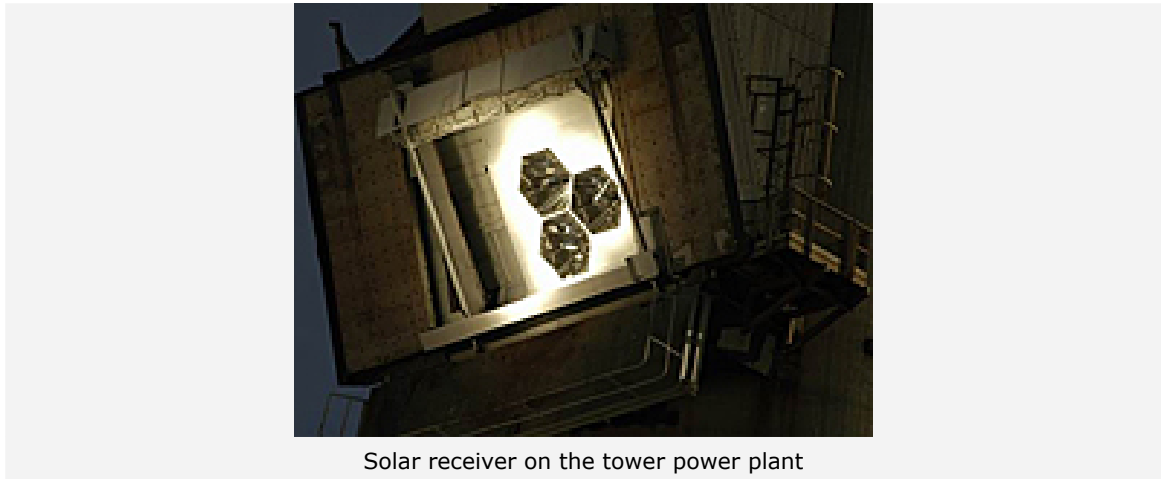


Solar tower power plant in Almería

First results presented at DLR's 11th Cologne Solar Symposium (11. Kölner Sonnenkolloquium) on 24 June 2008

There is a tremendous upsurge in interest in solar thermal power plant technology at the moment. Solar-powered gas turbines have the potential to utilise solar radiation to generate electrical power at the highest possible level of efficiency. In Almería in southern Spain, scientists of the German Aerospace Center (Deutsches Zentrum für Luft- und Raumfahrt; DLR) have for the first time put into commission a solar-hybrid gas turbine which uses concentrated solar radiation and biodiesel.

DLR has built the test plant on the CESA-1 solar tower of the Plataforma Solar de Almería in cooperation with eleven international partners in the Solhyco project, supported by the EU. The mirror field to the north of the solar tower redirects the solar radiation and focuses it onto three so-called solar receivers. These three solar receivers, which are connected in series, gradually heat the compressor air of the 250-kilowatt gas turbine to 800 degrees Celsius.



Solar receiver on the tower power plant

Energy provision in the absence of solar radiation

When necessary, the turbine's combustion chamber is switched on. Fuelled by biodiesel, it ensures the constant provision of electrical energy, irrespective of the time of day and the weather conditions. The research objectives of this project were to adapt the combustion chamber of the gas turbine for this purpose, and to establish how the injection of the biofuel can be regulated. In principle, both gaseous and liquid fuels can be used in plants such as these.

In a second phase of the project, the scientists want to build on these test results by fitting a commercial 100-kilowatt micro gas turbine with a tubular receiver developed at the DLR Institute of Technical Thermodynamics (DLR-Institut für Technische Thermodynamik), and testing it intensively in the CESA-1 solar tower in Almería as well. In the medium term, a demonstration plant with a capacity of about five megawatt has been planned near Seville.

In connection with the increasing expansion of solar thermal power plant technology, projects with a total capacity of more than nine gigawatt are currently either under construction or in the planning stage throughout the world. Over the past year, new plants with a total capacity of 76 megawatt have been put into commission. Most of the currently projected plants are based on parabolic trough technology, but several consortia are already planning solar tower power plants. PS10 in Seville, with a capacity of eleven megawatt, has already been taken into operation as the world's first commercial solar tower power plant. In the North Rhine-Westphalian town of Jülich, DLR is currently involved in the construction of a small solar tower power plant, which will function as a pre-commercial demonstration plant.

The great potential of solar tower power plants discussed in Cologne

The 11th Cologne Solar Symposium on 24 June 2008 focuses on solar tower power plants. The technology used in these plants is demonstrated, and progress reports on the operation and planning of solar tower plants are presented. About 200 participants from Germany and abroad will discuss the potential of this type of plant in comparison to other solar thermal technologies for generating electrical power.

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