

Solar Thermal Power Whyalla

A BASE LOAD SOLAR POWER STATION FOR WHYALLA?

At Whyalla, work is being carried out on a project to combine a solar powered collection system with a very clever energy storage system. This project will deliver emission free, multi-megawatt base load or on-demand peak electricity generation in 2009.

HOW DOES IT WORK

At the heart of the plant are the unique 'Big Dish' solar thermal concentrators and an ammonia based solar energy storage system. The storage system heats ammonia to 750°C, using solar energy, to dissociate the ammonia into its component gases hydrogen and nitrogen, and when combined back into ammonia, the high heat levels given off can be used to super-heat steam. The 'Big Dish' is the world's largest high performance parabolic dish solar thermal concentrator and can concentrate the sun's rays 1,500 times to produce temperatures of over 1,200°C. The 'Big Dish' to be used in Whyalla is 500m² and has increased concentration and performance ratios even further.

COMPARISONS

There are three basic types of solar power concentrators: trough, tower and dish. All three use mirrors to focus the heat, but there are differences in terms of the increases power per area. Trough systems deliver an increase of 15 to 90 times, tower systems from 600 to 1,000 times, while dish systems can boost to more than 2,000 times. Coal fired steam runs turbines at 500 to 600 degrees centigrade to get the required efficiencies. Trough systems generate steam at 250 to 400 degrees, tower systems at up to 1,000 degrees, and dish systems can generate up to 1,500 degrees.

WHYALLA

The Whyalla project will integrate an array of Big Dishes with the ammonia-based solar energy storage system to power a thermo-chemical process that stores concentrated solar energy until it is required to generate electricity - at any time day or night, in any weather conditions and on a continuous base load or on-demand peaking basis. International interest is keen not only because of the delivery of large-scale base load and on-demand electricity from solar energy, but also because the high temperature thermo-chemistry makes possible an array of other energy conversion opportunities.

WIZARD POWER

Wizard Power is the Australian company leading the work on the Whyalla Project. Its mission is to deliver competitive renewable energy to the nation through integrated solutions that combine multi-megawatt solar energy collection and storage with systems for electricity generation, desalination, waste water treatment, chemical processing and thermo-chemical energy conversion.

FURTHER READING

ANU Solar Thermal Energy Research: Concentrating Solar Power Systems

http://solar-thermal.anu.edu.au/high_temp/concentrators/basics.php

IEA SolarPACES: Library / Resource Centre

<http://www.solarpaces.org/Library/NewDocs.htm>