

Solar thermal power stations

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*“The race is on to determine which concentrated solar power technology can deliver particularly in the uncertain economic climate.”
(Reese Tisdale)*

Solar power is the generation of electricity from sunlight. This can be direct as with photovoltaics (PV), or indirect as with concentrating solar power (CSP), where the sun's energy is focused to boil water which is then used to provide power. Solar power has the potential to provide over 1000 times total world energy consumption in 2008, though it provided only 0,02% of the total that year. If it continues to double in use every two or three years, or less, it will become the dominant energy source this century [1].

Concentrated solar thermal (CST) is used to produce renewable heat or electricity (generally, in the latter case, through steam). CST systems use lenses or mirrors and tracking systems to focus a large area of sunlight onto a small area. The concentrated light is then used as a heat source for a conventional power plant (solar thermoelectricity).

A wide range of concentrating technologies exist, including the parabolic trough, Dish Stirling, Concentrating Linear Fresnel Reflector, Solar chimney and solar power tower. Each concentration method is capable of producing high temperatures and correspondingly high thermodynamic efficiencies, but they vary in the way that they track the Sun and focus light. Due to new innovations in the technology, concentrating solar thermal is becoming more and more cost-effective.

Since solar radiation is intermittent, solar power generation is combined either with storage or other energy sources to provide continuous power. On a larger scale, in Germany, a combined power plant has been demonstrated, using a mix of wind, biomass,

hydro-, and solar power generation, resulting in 100% renewable energy.

The solar thermal power industry is growing rapidly with 1,2 GW under construction in April 2009 and another 13,9 GW announced globally through 2014. Spain is the epicenter of solar thermal power development with 22 projects for 1037 MW under construction, all of which are projected to come online by the end of 2010. In the United States, 5600 MW of solar thermal power projects have been announced. In developing countries, three World Bank projects have been approved for integrated solar thermal/combined-cycle gas-turbine power plants in Egypt, Mexico, and Morocco [2].

A study done by the Greenpeace International, the European Solar Thermal Electricity Association, and the International Energy Agency's Solar PACES group investigated the potential and future of concentrated solar power. The study found that concentrated solar power could account for up to 25% of the world's energy needs by 2050. Also, with this expansion of concentrated solar power, thousands of new jobs would be created and millions of tons of carbon dioxide would be prevented from being released. The increase in investment would be from 2 billion Euros worldwide to 92.5 billion Euros in that time period. Spain is the leader in concentrated solar power technology, with more than 50 projects approved by the government in the works. Also, it exports its technology, further increasing the technology's stake in energy worldwide. Because of the nature of the technology needing in desert areas, experts predict the biggest growth in such places like Africa, Mexico and the southwest United States [3].

Bibliography:

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2. REN21 – Renewables 2007 Global status report.
3. http://en.wikipedia.org/wiki/Concentrating_solar_power
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