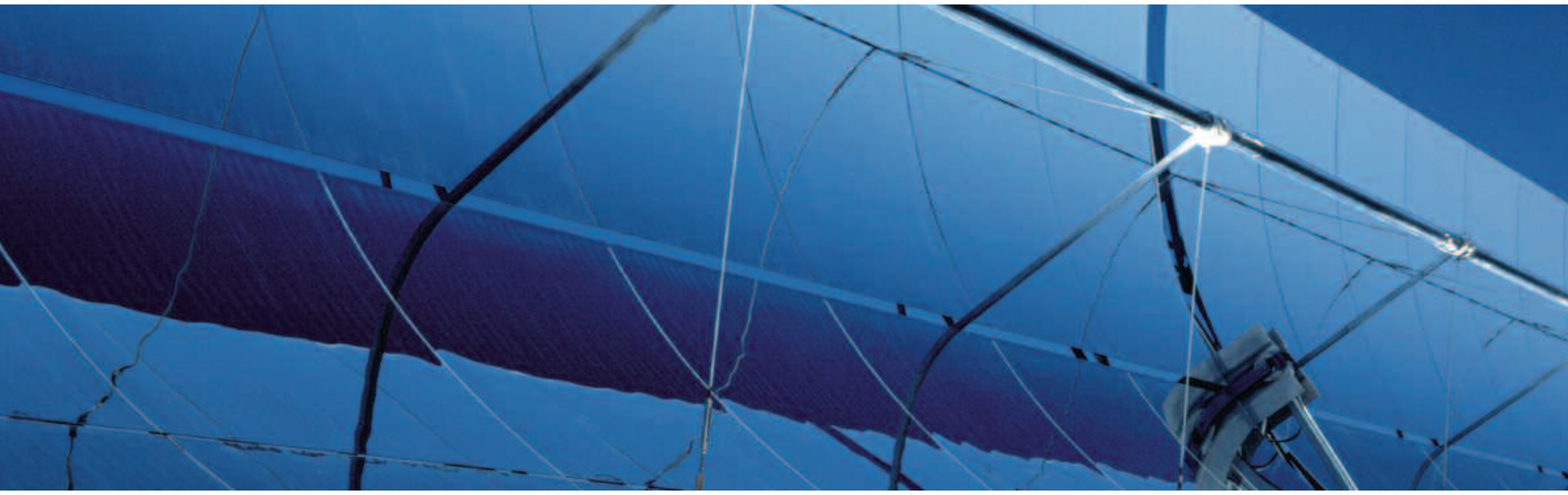
Electricity from solar thermal plants



After early successes in the USA at the end of the 1980s, a new market is now developing for solar thermal power stations in Southern Europe, the USA and in some developing sunbelt countries. Three types of solar thermal power stations have evolved here:

- Parabolic trough systems
- Solar tower systems
- Dish Stirling systems

By 2010, experts expect some 400 MW of newly installed power output in Europe and about 2000 MW worldwide. German industrial firms are taking a leading role in these developments. From about 2030, electricity imports from solar thermal power stations in Southern Europe or North African countries using high voltage direct current transmission into the European electricity grid will be able to make an important contribution to the European electrical landscape. Investor consortia are putting a figure of 12 to 15 cents per kWh on the cost of generating electricity in commercial solar thermal power stations which are in the planning stage at present. Going down the learning curve, full competitiveness with medium or base load electricity could be reached at good locations by 2030, with 15 GW being installed worldwide if research and development is continued.

Research and development requirements

One particularly important approach to cost reduction is to increase the exit temperature of the concentrating solar systems in order to achieve better efficiency in the downstream power station. This would enable the same electrical energy to be generated from smaller collector surface. All three solar thermal power station types would also benefit from:

- Automation of plant operation
- Development of cost-effective thermal energy storage
- Reducing the weight of collectors and concentrators

Parabolic trough technology

- Further development of direct solar steam (DISS) technology
- Selective solar absorber layers for high temperatures of around 500°C
- Development of new optical concentrator concepts, e.g. Fresnel reflector systems

Solar tower technology

- Technological development for coupling solar heat to gas turbines to tap the high temperature potential
- Development of cost-effective mirrors and highly reflective mirrors

Dish Stirling technology

- Development of solar/fossil and solar/biomass hybrid system configurations

Solar power plants

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