



Solar Thermal Power Report

Fourth Edition, 2010

The Solar Thermal Report

4th Edition, 2010

Executive Summary – Overview of the market

The solar thermal market has been hit hard by the economic downturn and the subsequent decline in demand from the construction sector. Several companies have filed for bankruptcy, including the market pioneer, Rayosol. For yet another year, Chinese manufacturers' experienced steady growth and sales of Chinese manufactured vacuum coolers are starting to overtake sales of flat plate collectors.

The reduced government support for solar thermal in Australia is expected to result in reduced sales in 2010. Other governments are expected to reduce subsidies as part of austerity measures.

Despite this, 2009 was the year for CSP, with the MENA region making significant plans to invest in the space and the UAE now building a 100 MW plant. Overall plants are getting bigger and utilities are starting to take an interest, as prices are dropping. Once the domain of parabolic trough technology, solar towers are starting to make inroads into the sector, with the US investing heavily into R&D on towers. Towers have a lower water footprint than trough systems, making it ideal for water-stressed regions, and a significantly higher efficiency and storage capacity than the other three CSP technologies. eSolar, a tower manufacturer, announced major supply contracts in China and India.

As well as solar towers, solar thermal storage is a major area of CSP research, with more and more planned projects in the US having storage capacity. Molten salt is likely to remain the dominant technology due to its low cost.

ABS Intelligence: Market Highlights

Big players are starting to enter the CSP sector with Areva's acquisition of Ausra, a parabolic trough manufacturer, and Siemens' acquisition of Solel Solar Systems and Archimede. Perhaps this is partially due to increased interest in the Desertec plan to connect the grid systems of North Africa and Southern Europe, and invest in renewable energy projects in the region. As part of the plan CSP plants in North Africa would supply cheap electricity to Southern Europe, due to their lower capital costs. Major Banks and manufacturing companies became members of Desertec this and last year, including Siemens and Deutsche Bank.

One major use of CSP that has garnered interest is its coupling to desalination plants. Several such plants are in the planning stages in the water-stressed MENA region, along with ISSC plants, which are still popular.

For 2010, major markets for CSP will continue to be the USA and Spain, along with MENA countries, India, China and perhaps, Australia.

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7.6.17 Jordan

Under the country's national energy strategy, the Kingdom has a target of 600MW of wind and 300-600MW of solar energy by 2020.

A 30 MW volumetric-type solar power tower is being constructed by Phoebus, a European industrial consortium. The consortium carried out site and feasibility studies, collected weather data and identified financing but further project development was delayed by the Gulf war. In 1997, a START (Solar Thermal Analysis, Review and Training) team, composed of IEA/SolarPACES representatives from Egypt, Germany, Israel, Spain, Switzerland and the US, with guest observers from the European Union, also visited Jordan, with the mission hosted by the Jordanian National Electric Power Company.

In 2001, a request for solar plant proposals for a second project was published by the Government. Solar Millennium AG (Germany) who submitted a proposal to build a solar hybrid plant in the Quwairah area of southern Jordan (35km north of Aqaba) to generate 100-150 MW of electricity and to be implemented on a Build, Own and Operate (BOO) basis. The solar element will be backed up by gas or heavy fuel quarry.

Projects in the pipeline include:

- 'JOAN 1': 100 MW installation in the Maan Province costing around US \$418 million. It is likely that the project will use Ausra's linear fresnel technology, although this is not set in stone. Following the success of a 5MW pilot project funded by the EU, tendering for the project is expected this year. Project completion will happen sometime in 2013. Half of the project will be funded from concessional financing, 20% to 25% from equity and the rest from commercial debt. US \$72 million is available for the project from the Clean Technology Fund.
- Aqaba-Qatrana transmission project: A 400 kW interconnector to enable the grid to accommodate new renewable energy projects and export power. A tender for the project and awarding of contracts is expected this year with commissioning of the project expected in 2012 or 2013. Total project costs should be in the region of US\$ 110 million, of which US \$40 million will come from the Clean Technology Fund. The rest is likely to be financed from multilateral concessional funds (approximately 45%) and the Jordanian government (10%).

These projects will be granted tax and customs exemption.

7.6.18 Libya

The country is keen to maximise oil and gas exports. The Libyan government is currently discussing a law to liberalise the renewable energy market and introduce a feed-in tariff.

A feasibility study for a 100 MW has been conducted by Abengoa Solar and the Renewable Energy Authority (REAOL). Tendering for the project is expected in 2010.

7.6.19 Mexico

After some delays CFE, the state utility of Mexico has approved the construction of two ISCC plants, with 30 MW and 80 MW solar capacity, in two 500 CCGT plants, at Laguna and – Agua Prieta.

After a feasibility study by Spencer Management Associates, working on behalf of the World Bank and CFE, CFE issued a Request for Proposals (RFP) for a 198 MW gas-fired combined cycle with an optional integrated parabolic trough solar field of at least 25 MW. This project is still in the planning stages. Funding of US \$50 million for the project from the GEF is still pending.

TcTec in conjunction with Utility Scale Solar is developing a 1 MW solar tower project. However, progress so far has been slow.

To date no utility scale projects are under construction or have been commissioned. Difficulties in accessing financing has been a major barrier to getting projects off the ground, despite the country's high electricity prices of around \$0.10/kWh.

There has also been talk of CSP plants in Mexico supplying customers in the USA, where land prices are lower. It is estimated that CSP plants require around 2 hectares/MW. Although, no projects have entered the planning stages.

7.6.20 Morocco

The Ain Beni Mathur ISCC hybrid solar thermal project was initiated by the Moroccan state utility Office National de l'Electricité (ONE) in 1994 with plans to come on-stream in 2009 when it was partially operational and be completely operational in May 2010. However, the project is still under construction but is expected to be completed this year. The project will supply 8.5% of national production in normal times. The plant was originally designed to have a capacity of 249 MW but has been expanded to 472 MW. The station is the world's first combined cycle solar-thermal plant and will have 20 MW of solar and 453 MW of gas-fired capacity.

The project engineer was Fichtner. The station is being constructed by Spain's Abengoa Solar and is an IPP owned by Abener Energia SA of Morocco, with a PPA to sell the output to ONE. The project has a GEF grant.

Total cost of the project was Dhs 4.6 million.

A further three projects are in the development stages and will all be allocated to IPPs through a competitive tendering process. Projects include:

Ain Beni Mathar: A 125 MW parabolic trough installation contiguous to the 473 MW ISCC system in place. Most of the feasibility work has been completed and the project should cost in the region of US \$525 million. The Clean Technology Fund has already approved US \$90 million for the project.

Tan Tan: A 15 to 50 MW project which will generate electricity and produce desalinated water through reverse osmosis. The project will include energy storage and will desalinate 1,700m³ of brackish water every year. Total costs of the project should be around US \$240 million, of which US \$35 million has already been granted through the Clean Technology Fund.

Quarzazate: A 100 MW plant using trough technology. It will be located near a dam with all year round fresh water availability and a city with 100,000 inhabitants. At present there are no plans to include energy storage in the project which is estimated to cost US \$440 million. The Clean Technology Fund has already approved US \$72 million for the project.

In November 2009 five more sites were selected for the production of solar thermal electricity. The combined acreage of the sites is 10,000 ha with a potential capacity of 2 GW. Development of the sites will cost in the region of US \$9 billion.

7.6.21 Namibia

The Namibian government has provisionally offered for a prefeasibility study for a 400 MW solar tower plant in the country. The project should be eligible for carbon credits under the Kyoto Protocol.

Solar water heaters are mandatory for public buildings.

7.6.22 Oman

The government is planning to announce a tender for a 50 MW to 150 MW CSP plant upon completion of a pre-feasibility study. Construction should begin in 2010.

7.6.23 Qatar

Chevron Qatar Energy Technology and GreenGulf have agreed to conduct a joint study on the potential for different solar technologies in the country. Both companies are planning to each invest up to US \$10 million on the project. Completion of the project is expected between 2012 and 2014.

7.6.24 Saudi Arabia

The Saudi government recently announced plans for the country to become a major exporter and researcher on solar power. In January 2010, the King Abdulaziz City for Science and Technology launched its National Initiative for Solar Water Desalination (NISWD) under the

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