

SOLAR

Making solar power work

With oil prices rising and growing concern over climate change, solar energy is becoming an increasingly feasible option for the region

BERNADETTE REDFERN

Solar power advisers, contractors and developers are understandably excited about developments in the Middle East and North Africa. Plans for solar energy complexes that cover vast swathes of desert and feed power to Europe are now being taken seriously by governments in the EU, who are backing the initiative, called 'Desertec'.

"People laughed about such plans for 20 years, but now there are two serious problems that solar power can solve: the price of oil and climate change," says Georg Brakmann, head and co-founder of German solar energy engineering firm Fichtner Solar.

Fichtner Solar is advising on several schemes in countries across the region including Morocco, Egypt, Iran and the UAE. It is also bidding to carry out the feasibility study for a solar power plant proposed by Dubai Electricity & Water Authority (Dewa).

"We were preparing the proposal for 21 July, but it has been postponed until 5 August," says Brakmann. "It was originally a very short timeframe and although we could have met the deadline, Dewa had several requests for delays."

Unlike many of the schemes proposed or under way in North Africa, the UAE projects are understood to be pure solar power generation rather than hybrid solar/gas plants.

Abu Dhabi's planned 100MW facility, for which four contractors have pre-qualified, was originally to be a 400MW integrated solar combined cycle facility (see diagram), but the design has since been amended to solar power only.

Increasing efficiency

Hybrid plants are common as they allow for cost savings through economies of scale. "You can get greater efficiency with integration," says Brakmann. "The cost of going up from a turbine for a 100MW plant to a 150MW plant is less than building the plants separately."

For Gulf states, the attraction of solar power generation is that it frees up oil and gas for export. The problem is working out how the financial framework for such plants will



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operate when domestic electricity costs are heavily subsidised.

"The problem is that there are no feed-in tariffs and no financial frameworks," says Henner Gladen, chief technical executive officer of German solar power contractor Solar Millennium. "Abu Dhabi, Dubai and Oman will build solar [power plants] in the next few years, but the problem they have is that they do not sell electricity [generated from gas feedstock] at world market prices. For solar power, they will have to pay more."

The financing of such schemes will depend on having an off-taker prepared to pay market rates of about \$0.20 a kilowatt hour (kWh). This compares with domestic user tariffs of \$0.05-0.09 a kWh for Dubai, Sharjah and the northern emirates, and \$0.01-0.04 a kWh in Abu Dhabi.

But it is the governments of oil-producing countries, not their energy consumers, that will get the most benefit from solar power. Power sourced domestically leaves more gas for export, which effectively pays for the solar generation. But mechanisms for this are yet to be determined.

Tariff systems

In markets where solar power is contributing to the grid, such as Spain, there are feed-in tariffs where developers are guaranteed a price for a fixed term of up to 25 years. This makes securing financing straightforward.

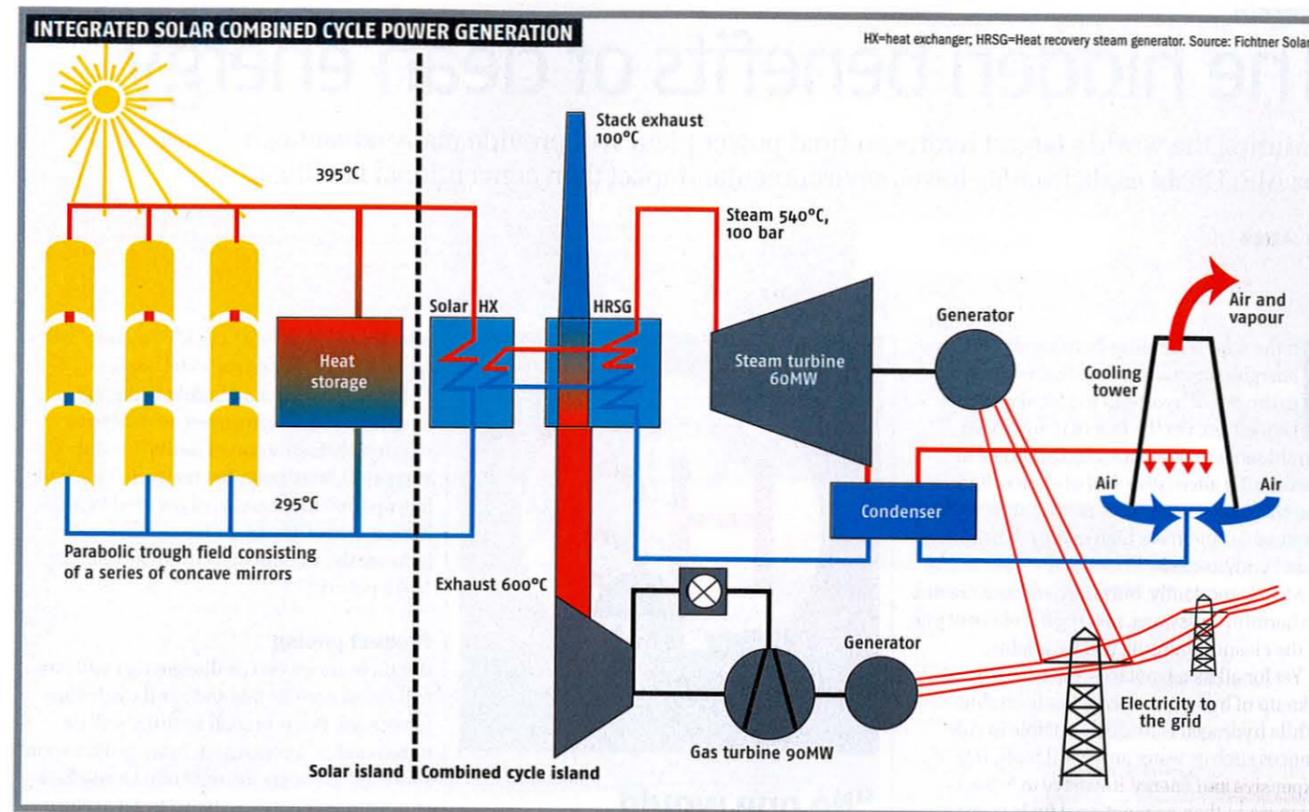
"You can assume very competitive conventional project financing interest rates, especially in Spain, where they have 25-year feed-in tariffs," says Gladen. "Nothing is as secure as this. There is no risk. The costs are fixed and pre-determined."

In Algeria, the feed-in system is more complex as the hybrid system qualifies for the tariff but pure solar generation does not. However, proponents of solar energy say it is a step in the right direction and something they expect to change as Algeria pursues its ambitious renewable energy plans.

The organisation New Energy Algeria is responsible for ensuring the country meets its targets of producing 5 per cent of its energy from renewables, chiefly solar power, by 2010. Its first major solar-hybrid project at Hassi R'mel is under way and Algeria is working with the German Aerospace Centre on developing solar/thermal power technology on a larger scale, with 200MW plants being a key objective. The largest thermal solar plant in operation to date is a 50MW facility in California.

Solar/thermal energy is favoured on a commercial scale above photovoltaic (PV) production as, according to experts, it is about half as expensive to build and maintain.

"Concentrated solar power (CSP) is the one and only technology proven on the utilities scale," says Gladen. "It can store energy in the form of heat. Photovoltaic cells must store power in batteries, which is prohibitively



expensive. CSP is in the very early stages of maturity. The technology has been proven over the past 25 years and now the costs are beginning to fall. Bigger units mean greater efficiency and greater economies of scale in the supply chain."

The supply chain, made up of the manufacturers of the components used in solar plants, such as the mirrors, heat absorbers and turbines, is largely based in Spain, Germany and the US. But Abu Dhabi Future Energy Company (Masdar), through its Masdar PV subsidiary, is investing \$600m in two facilities to manufacture thin photovoltaic film: one in Abu Dhabi and another in Germany.

"The first - in Erfurt, Germany - will be operational by the third quarter of 2009, and a second facility in Abu Dhabi will begin initial production by the third quarter of 2010," Sultan al-Jaber, CEO of the Masdar initiative tells MEED.

Saudi Arabia is also pushing to set up a solar manufacturing base, but so far suppliers have been keen to remain close to established solar markets. However, there has been some development of the sector in the kingdom. A joint venture of Saudi Arabia's Chemical Development Company (CDC), Norway's Norsun and

Saudi investment firm Swicorp, via its subsidiary Jousour, are to invest in a polysilicon plant at Jubail.

Polysilicon is the material used in the manufacturing of photovoltaic cells, and global production capacity is understood to be lagging behind demand. The process is highly energy intensive, making Saudi Arabia a sensible choice for a production base.

"Polysilicon fits in with our strategy of targeting energy-intensive industry," says Faysal Hamza, CEO of Jousour. "There are four stages in the production of polysilicon: creating chunks, then ingots, then processing into wafers, and finally panels. We are only doing the first stage, but eventually we could go further along this road. I would like to see that happen."

Domestic demand

The production capacity for polysilicon at the Jubail plant will be the equivalent to 500MW a year, or 30,000 tonnes. Initially, all material will be sold to two firms. "There are two off-takers: Norsun and the US' Sunpower," says Hamza. "There might be domestic demand in the longer term, but not in the short term."

Commercial production is planned to commence in 2010. Eventually, Hamza envisages

the plant will form the start of a solar manufacturing hub for Saudi Arabia. "We will try to develop a long-term solar cluster in Saudi Arabia," he says. "This plant would be a primary building block that could stimulate development of a cluster."

But solar experts say it will be some time before this happens. "Saudi Arabia is running after technology firms asking them to set up there, but until the domestic market is big enough this will not happen," says Gladen. "When a domestic market begins, then they will quickly move to the kingdom."

Although it may be some time before manufacturers decide to invest in the Middle East, progress is under way in terms of building solar capacity.

Critics claim that this type of resource is simply not economically competitive, while its supporters say the more facilities that are built, the cheaper the technology will become.

In the mean time, Middle East governments must reconcile the additional cost such production methods entail with the need to reduce the use of domestic oil and gas. Asking consumers to pay more for solar power generation is not an option. So for now, governments must foot the bill.