Solar power

A painful eclipse

Solar power companies are struggling. But the survivors will have a bright future

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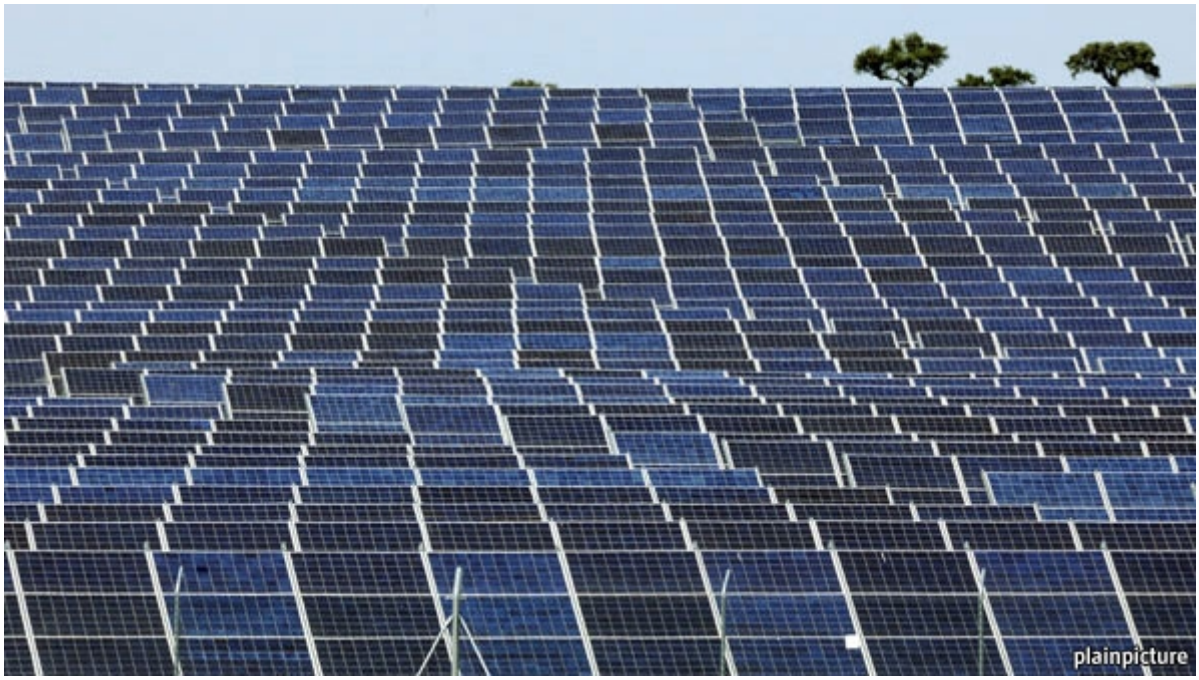

TALL, broad and Texan, Raymond Christian, the ex-marine in charge of building Agua Caliente, a 1,750-acre solar power plant in Arizona, is no green-tech hippie. "I'm a conservative," he says, on a tour of the plant's avenues of shiny black solar panels. "But I believe in what we're doing here. What we're getting into here is where we start getting somebody's attention."

He is right. Agua Caliente, which is being built by First Solar, a big manufacturer of solar panels, is impressive. The previous day, Mr Christian laid his millionth panel. By the time the plant is completed, three years hence, it will have over 5m panels and be one of the world's biggest solar power stations, with a maximum generating capacity of 290MW. That is similar to a small gas-fired power station. Two other plants First Solar is building in California will have capacities of 550MW.

These are among an array of large solar plants being built in Arizona, Nevada and California to meet California's Renewables Portfolio Standard: a decree that 33% of its electricity must come from renewable sources by 2020. Largely as a result, America's demand for solar modules doubled last year, albeit from a low base, and this year it will probably double again.

As the world's lowest-cost maker of solar panels, First Solar, which is based in Arizona, is well-placed to cash in. Spurning crystalline silicon, the main ingredient in most solar

panels, it uses another sort of semiconductor, cadmium telluride, a product of mining waste which it deposits onto glass at high temperature. The "thin film" photovoltaic cells this produces are relatively inefficient at converting solar radiation into electricity. First Solar's panels have an average efficiency rate of 11-12% as opposed to 14-15% for the silicon ones. Yet they are cheap, costing around 74 cents per watt of generating capacity, compared to well over a dollar for the cheapest silicon panel. And they are getting better, with over 17% efficiency achieved in lab conditions. They also perform well at high temperatures and through dust—making them suitable for deployment out West.

The company looks in fair shape. It has over 2,700MW of projects in the pipeline and expects in 2012 to become the world's biggest installer of solar power. Nor does it appear complacent. As a hedge against the ever-present threat of being outgunned on its technology, it has begun experimenting with a newer and more efficient sort of thin film, with a semiconductor of copper, indium, gallium and selenium, known as CIGS. Yet First Solar's share price is tanking. It is currently at $60, down from $175 less than a year ago. This is a sign of a serious crisis in the solar industry, from which no firm is immune.

Demand for solar panels doubled last year, driven by soaring growth in Germany and Italy. This was a response to tumbling prices of solar panels, triggered largely by a big increase in polysilicon production capacity. In 2008 and 2009, the average price of a solar panel halved. Yet European subsidies for solar power, which are largely responsible for the industry's emergence, hardly fell. Hence last year's surge in demand, especially in Italy, where panel sales increased by 857% .

The cost to European electricity users was enormous: they cover the subsidies, which are known as feed-in tariffs, in their bills. So Europe's regulators have moderated their largesse. France announced a moratorium on its feed-in tariff last December, and Italy and Germany also made their subsidies less generous. Wider economic ills in Europe have given investors further pause, causing European demand for solar panels to plummet. In Germany, annual sales are expected to fall by more than 30%. Despite growth in America and China, global demand for solar sales is expected to grow by less than 10% this year.

A mountain of panels

That leaves the market seriously oversupplied. In expectation of more roaring growth, the world's panel-making capacity was tripled over two years, 2010-11, with big investments in mainland China and Taiwan. Much of the excess capacity is being shut down, yet there are already plenty of unwanted panels out there. To avoid being stuck

with old stock—a ruinous prospect when prices are falling rapidly—panel-makers are now slashing margins.

Early this year the average panel price was around $1.75 per watt; by the year's end it could be as low as $1.10. That is less than the cost price for many Western manufacturers and small Asian ones, several of which have already gone bust. They include Solyndra, an American firm that was given a controversial $535m federal loan guarantee shortly beforehand. With analysts predicting sluggish growth until 2013, there is plenty more consolidation to come. According to David Crane, the boss of NRG Energy, an American firm that owns eight solar power plants, including Agua Caliente, "If you're a solar cellmaker, the world is a cruelly Darwinian place."弱肉強食

To survive, firms will need to keep cutting costs, especially in the non-panel parts of their product, including metalwork and wiring. They must also keep a grip on dwindling sources of credit. This will favour big Western firms and low-cost Chinese ones, especially those with friendly support from China's state-controlled lenders. Tom Werner, the boss of SunPower, another American panel-maker, sees the upside in this. "Necessity is the mother of innovation," he says. SunPower plans to reduce the complexity of its panels by 15%. Like many Western solar firms, it is also aggressively pursuing vertical integration. By making its own polysilicon and building its own power plants, it hopes to protect itself from the vagaries of supply in an immature market and also boost demand for its products. SunPower, which was bought in April by Total, an oil and gas giant, for $1.4 billion, can also count on good credit lines and access to markets.

For such companies, the longer-term prospects appear rosy. The cheapest solar power now costs $120-140 per megawatt hour. That compares with around $70 for the latest American onshore wind and $70-90 for gas-fired power. Yet in a growing number of scenarios, solar is becoming competitive with little or no subsidy. 日本はなぜこうならないのか

In many sunny places, including several American states and southern European countries, it is cheaper than the peak-time retail price of electricity. With increasing use of smart meters, which mitigate the problem of intermittency that plagues renewable forms of energy, demand for rooftop installations should grow strongly in these places. In emerging economies, where there is plenty of sunshine and soaring demand for electricity, the prospects are brighter. Power-starved Indians get 7,000MW of electricity a year from diesel generators—at a total cost of around $250 per megawatt hour. In India, China, Africa and the Middle East, solar should soon be a significant source of power.

But how significant? The price of solar power still has far to fall before it is cheaper than

electricity generated from fossil fuels—even if governments jack up fossil-fuel prices to reflect the cost of carbon emissions. And there are plenty of cloudy places, including northern Europe, where solar panels may never make much sense. That urges caution. Yet the solar industry has a lot of innovation ahead of it. Although most recent progress is based on incremental improvements, breakthroughs are possible. Applying nanotechnology to the design of solar cells is one possibility. Using more efficient semiconductors, such as gallium arsenide, which is currently too expensive for anyone except NASA, is another. Big developments in long-distance transmission lines, which are promised, could be most valuable of all. Despite the industry's current turmoil and future uncertainties, it has much to look forward to.