

Investing in clean energy

Tilting at windmills

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The clean-energy business is turning into the next big investment boom, in which risks are lightly brushed aside



UNTIL recently, recalls Charlie Gay, a 30-year veteran of the solar-power business, venture capitalists were far too busy catering to captains of the information-technology industry to waste time on “hippy-dippy tree-huggers” like himself. But now the tree-huggers are in the ascendant and the IT barons are busy investing in clean-energy technology.

Among them is Vinod Khosla, a celebrated Silicon Valley financier. He is touting ethanol as the next big thing. Applied Materials, where Mr Gay works, has branched out from flat screens and computer chips into solar cells. Sun Power, the solar subsidiary of Cypress Semiconductor, is now worth almost as much as its chipmaking parent company.

Investors are falling over themselves to finance start-ups in clean technology, especially in energy. Venture Business Research reckons that investment in the field by venture capitalists and private-equity firms has quadrupled in the past two years, from some \$500m in 2004 to almost \$2 billion so far this year. The share of venture capital going into clean energy is rising rapidly (see chart 1). New Energy Finance, another research firm, reckons that investment of all sorts in the business will reach \$63 billion this year, compared with just \$30 billion in 2004. The lure of big money is leading investment banks to ramp up their analysis of the latest boom industry.

Clean-energy fever is being fuelled by three things: high oil prices, fears over energy security and a growing concern about global warming. The provision of energy, the industry's cheerleaders say, will change radically over the coming decades. Polluting coal- and gas-fired power stations will give way to cleaner alternatives such as solar and wind; fuels derived from plants and waste will supplant petrol and diesel; and small, local forms of electricity generation will

replace mammoth power stations feeding far-flung grids. Eventually, it is hoped, fuel cells running on hydrogen will take the place of the ubiquitous internal combustion engine. It is a bold vision, but if it happens very slowly, or only to a limited extent, boosters argue that it will still prompt stupendous growth for firms in the business.

Analysts confidently predict the clean-energy business will grow by 20-30% a year for a decade. Jefferies, an investment bank that organised a recent conference on the industry in London, asked participants how soon solar power would become competitive with old-fashioned generation technologies: in 2010, 2015 or 2020. More distant dates—let alone never—were not even discussed. About three-quarters of those present, one visitor gleefully observed, were “cheque-writers”. This “megatrend”, the keynote speaker gushed, “may be the biggest job- and wealth-creation opportunity of the 21st century.”

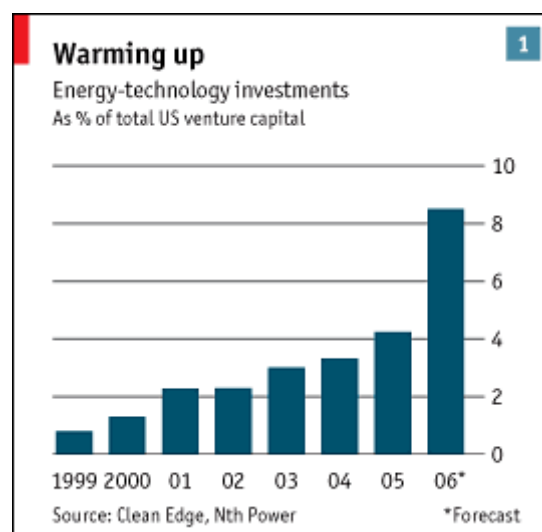
At a similar event devoted to solar power at San Jose, in the heart of Silicon Valley, registrations almost quintupled this year, to over 6,500 attendees. Arnold Schwarzenegger, California's green-minded governor, made a cameo appearance in the midst of his re-election campaign. “I feel the energy,” he bellowed to an elated audience, “I feel the electricity. Clean energy is the future.”

Such hyperbole might seem reminiscent of the dotcom bubble. But clean-energy advocates insist growth is sustainable because of the likes of Mr Schwarzenegger. The Gubernator is a hero in green circles because of his enthusiasm for environmental regulation. He easily won re-election partly because he seized on global warming as a concern and signed into law America's first wide-ranging scheme to cap greenhouse-gas emissions.

California also boasts America's most ambitious initiative to promote solar power, dubbed “One Million Solar Roofs”. The state will pay \$2.9 billion in rebates over ten years to households and businesses that install solar panels. The federal government also chips in with a tax credit of 30% of the cost of installation. All manner of businesses in the state, from FedEx to wineries in Napa Valley, are rushing to install subsidised solar panels (see [article](#)).

Renewable states

By 2010, California aims to generate 20% of its power from renewable sources. No fewer than 21 of America's 50 states have such “renewable portfolio standards”, which local utilities are obliged to meet within a set period. Voters in Washington approved one in the recent elections. Maine has the highest standard, of 30%, although its utilities already meet it thanks to the state's many hydroelectric dams. Among the most ambitious is New Jersey's, which will require



22.5% of energy to come from renewables by 2021. It has already become the second-biggest solar market in America, after California.

Other government policies ensure that making ethanol from corn is a lucrative business, despite lingering concerns that the manufacturing process consumes almost as much energy as the resulting fuel provides, so that the effort does no good for the environment or the cause of energy independence. Farmers receive subsidies for growing corn, refineries for mixing it into fuels, service stations for installing pumps to sell it and consumers for buying it. Moreover, several states have laws requiring that a certain amount of ethanol is mixed into petrol, helping to bolster demand. A recent study by the Global Subsidies Initiative, a pressure group, estimated that all this will cost American taxpayers at least \$5 billion this year.

America's incentives for clean energy, however, are relatively modest compared with Europe's. The European Union, for example, wants 5.75% of all transport fuel to come from non-fossil sources by 2010. Big refiners say the measure guarantees them a market for as much biodiesel as they can produce.

The EU also has a target for power from renewable sources of 18% by 2010. Analysts at Goldman Sachs, an investment bank, calculate that solar output would have to grow by over 30% a year to meet it. By their count, 49 countries have policies on renewables in place that will foster rapid growth at clean-energy firms, including big emerging markets such as Brazil, China and India.

Germany is perhaps the most generous. It has fixed the price of renewable power for the next 20 years on a sliding scale that will decline over time. Certain solar projects will receive as much as €0.57 (73 cents) for each kilowatt-hour of electricity generated, compared with the going rate for dirtier power of around €0.05. In normal circumstances, Germany would be a terrible place to install solar panels: it is not very sunny and has a good distribution grid, which solar does not require. But thanks to its "feed-in tariff", it is the biggest solar market in the world.

Around the world governments like Germany's have pledged billions, or in some cases unlimited sums, to advance the clean-energy cause. In the process, enthusiasts claim, they have "pre-booked" growth. Supporters argue that these subsidies are reasonable, since they encourage a worthwhile cause—the fight against global warming—that markets do not seem to prize highly enough.

What is more, the subsidies are not supposed to be permanent. Applied Materials' Mr Gay points out the cost of generating solar power falls steadily over time. The first cells, in satellites, cost about \$200 per watt of generating power. By last year the price had fallen to about \$2.70 per watt. That equates to a price decrease of about 18% every time production doubles, he calculates. Price decreases come inexorably with volume, he argues, so subsidies simply help to speed the process up by stimulating extra sales.

When subsidies go

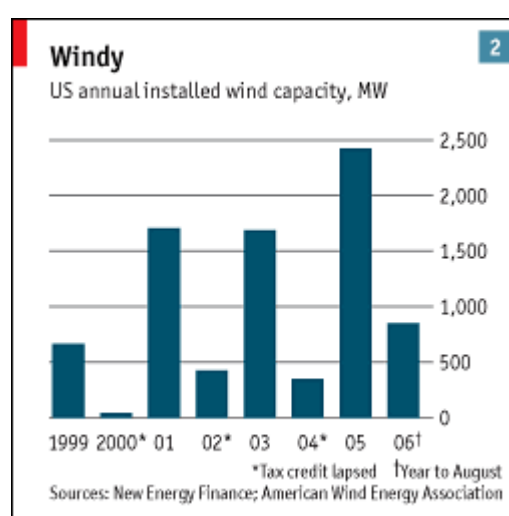
Eventually, the proponents of clean technology maintain, renewable energy will become competitive with fossil fuels, allowing governments to end subsidies. Mr Gay thinks solar power will be as cheap as that from big coal-fired power stations within a decade. Something of the sort has already taken place in Japan, where

last year subsidies for solar were phased out. When these were introduced in 1994, says Chris O'Brien of Sharp, the world's biggest maker of solar cells, a system typically cost some \$16,000 per kilowatt, of which the government paid half. About 500 systems were installed in the first year. A decade later, the cost had dropped to \$6,000 per kilowatt and 60,000 systems were fitted. Nowadays, he says, Japan is the first market "where customers have continued to buy solar systems without subsidy".

However, all this is somewhat misleading. Retail electricity prices in Japan are among the highest in the world, making it much easier for solar to compete. In most places, concedes Michael Liebreich, of New Energy Finance, renewable power and fuels will be more expensive than the dirtier sort for the "foreseeable future".

That leaves the clean-energy business largely dependent on government handouts. Shares in the sector rose after George Bush's state-of-the-union address in January, when he swore to wean America off dependence on foreign oil. They also rallied on hopes that the newly Democratic Congress would spend more money on greenery. Several of those elected, after all, tried to burnish their environmental credentials by running uplifting advertisements of themselves roaming the countryside amid majestic wind turbines.

But what one politician can mandate, another can terminate—and therein lies one of the biggest risks for clean energy. American politicians have periodically allowed a tax break for wind generation to expire, for example. This caused the industry to falter several times, before the credit was renewed again (see chart 2). It is due to expire once more next year. In similar fashion, the shares of European clean-energy firms fell this summer, along with the price of permits to emit carbon dioxide within the EU. The price of permits had fallen because European governments had handed out too many of them to polluters, thus flooding the market.



Voters, too, sometimes lose heart. In the recent elections, Californians, normally a reliably green lot, voted against a proposal to tax oil production to fund research into renewables. Yet clean-energy investors are gambling, essentially, that governments and the taxpayers who fund them will continue to spend lavishly on the industry.

A dramatic fall in the oil price will almost certainly prompt governments to tighten purse-strings, since subsidies become relatively more expensive. Developing new, carbon-free technologies will seem less urgent if there is plenty of cheap oil about. When oil prices fell in the 1980s, governments quietly dropped many of the grand plans for energy independence developed during the oil shocks of the 1970s.

In Mr Liebreich's view, oil-prices below \$50 a barrel would undermine the momentum of clean energy. Mr Khosla, the venture capitalist, warned delegates

at the conference in San Jose that they needed technologies that are “unconditionally cheaper” than fossil fuels: “If it ain't cheaper, it doesn't scale.”

For the time being, however, keeping pace with demand is more of a worry. Most manufacturers of wind turbines have full order books for the next few years. Executives at Neste, a big Finnish refiner, doubt Europe's output of biofuels can expand fast enough to meet the EU's target. The EU has also had to reduce its target for renewable power, since the industry could not grow fast enough to meet it.

The growth of solar firms has outpaced the supply of high-grade silicon needed to make their panels. Investors are now rushing to finance factories to produce the necessary silicon. Goldman Sachs expects output to double by 2010—raising fears of an eventual crash in prices. In the meantime, solar firms seeking financing are trying to distinguish themselves, either through contracts that assure their future supplies of silicon or through technology that reduces their consumption of it.

The potential for growth, most analysts argue, is clear. But bottlenecks and political setbacks, not to mention technological glitches, will create many bumps in the road ahead. Indeed, fears that the most euphoric investors were overlooking such obstacles seem to have contributed to a sharp fall in clean-energy stocks earlier this year—although they have since recovered much of the lost ground. Such jitters caused several green-energy firms to cancel planned flotations.

“There's legitimate debate about a couple of segments,” says Keith Raab, boss of Cleantech Venture Network. In some instances, valuations accorded to firms with no profits—and little chance of making any soon—were reminiscent of the excesses of the dotcom bubble. As Douglas Lloyd, of Venture Business Research, puts it, “There's too much money chasing too few opportunities. How is it possible that this many solar companies are going to succeed? They're not.”