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News Analysis

By Justin Hibbard

Bright Days for NanoSolar

The Silicon Valley startup has just lined up \$100 million in venture capital and plans to manufacture affordable solar panels using proprietary technology

When NanoSolar was founded in 2002, the Palo Alto (Calif.) solar-energy startup drew plenty of skepticism. After all, the dot-com bubble had been reduced to a soap stain two years earlier, just months after 34-year-old NanoSolar founder and Chief Executive Officer Martin Roscheisen had sold his e-mail list service eGroups to Yahoo! ([YHOQ](#)) for \$450 million. Now he was jumping right into the next hyped-up sector: alternative energy.

It didn't help that NanoSolar's investors included Google ([GOOG](#)) founders Larry Page and Sergey Brin, and Benchmark Capital, the venture-capital firm that struck e-gold with eBay ([EBAY](#)). What did a bunch of dot-com millionaires know about solar energy?

Quite a bit, it turns out. Three years later, things are looking much brighter. In the next six weeks, NanoSolar plans to begin building a factory in the San Francisco Bay area that could pump out as many as 200 million solar cells—semiconductors that convert sunlight to electricity—each year. That will be enough to fill 2 million average-sized panels.

The company expects to assemble the cells into more than 1 million solar panels annually in another factory near Berlin that it plans to open next year. It figures that making its panels will cost as little as 10% of what it costs to turn out current panels, eventually putting them within financial reach for lots more consumers.

Without a doubt, the promise is popular with financiers. NanoSolar announced this week that it has raised \$100 million in a third round of venture-capital financing, one of the 10 biggest VC fundings in the U.S. so far this quarter, according to Standard & Poor's CapitalIQ Div. That brings the startup's total funds raised since inception to \$125 million.

CAPITAL-INTENSIVE BUSINESS. Of course, that money could prove to be as much a curse as a blessing. The more money goes into a startup, the more it takes to produce a return for investors. "History says you want to be very measured about spending money," cautions Erik Straser, a general partner at Menlo Park (Calif.) VC firm Mohr Davidow Ventures, which has invested in NanoSolar. "I think the company has been very good about that."

But the NanoSolar game plan takes money. Solar-cell manufacturing is capital-intensive, demanding a lot of money before it throws off cash. That's why so much of NanoSolar's strategy is focused on efficiency.

Since the 1970s, most solar cells have been made of silicon and manufactured like computer chips—a costly process. By contrast, NanoSolar plans to produce so-called "thin-film" solar cells, making them by printing special-purpose ink on sheets of lightweight foil. "The major breakthrough here is we move the solar business from the economics of the semiconductor business to the economics of the printing business," Straser says.

That move, Straser figures, will allow NanoSolar to operate 5 to 10 times more efficiently than traditional solar-cell manufacturers, measured by the ratio of capital expenditures to revenues. If all goes as planned, Wall Street analysts should eventually be able to predict how much additional revenue NanoSolar will generate for every dollar it spends to increase manufacturing capacity—a heretofore difficult feat in the solar industry.

TINY BEADS. But NanoSolar still has to prove itself. Past attempts at producing thin-film solar cells have disappointed. In 1997, Cambridge (Ont.) manufacturer ATS Automation Tooling Systems acquired thin-film technology that bonds tiny silicon beads to foil.

The company spent about \$90 million on a new plant to commercialize the technology, which was originally developed by chipmaker Texas Instruments ([TI](#)). In May, news that ATS plans to write down nearly the entire cost of developing the technology lopped 25% off its stock price. "They thought they could get the process up quickly, and we're still waiting," says Tom Astle, an analyst at National Bank Financial in Toronto. "Building a commercial process to manufacture these things is more challenging than some people think."

Another problem: Thin-film solar cells historically have produced electricity less efficiently than silicon cells when measured by dollar per watt. So, while thin-film cells may cost less than silicon cells, consumers may have to buy and install more of them to produce enough power.

PORTFOLIO OF PATENTS. NanoSolar's management isn't worried. They claim the company's printing process is less expensive and more efficient than vacuum-based processes that have been used to make most thin-film cells in the past. And they say their cells will generate as much electricity as silicon cells—at one-fifth to one-tenth the cost. "We will be the cost leader," says Brian Sager, co-founder and vice-president of finance and corporate development.

What makes him so sure? First, a recent worldwide shortage of polysilicon has caused a scarcity of silicon solar cells and driven up prices. Second, NanoSolar has assembled a fortress-like portfolio of patents and trade secrets to keep its ink, product design, and printing process proprietary. The company believes no one will be able to copy what it is doing.

Sager won't say when NanoSolar expects to turn profitable but doesn't anticipate the company will need to raise more venture capital to get there. Even at low initial manufacturing volumes, the outfit will earn more money from sales of its products than it spends making them, he says. NanoSolar already has several orders from large system integrators, which will install the company's solar panels at power plants, big-box retailers, and homes.

GERMAN BACKING. Another big plus for the company is the talent that comes along with its latest financing. Investors in the round include heavy hitters from the solar industry. Stuttgart private-equity firm Grazia Equity previously funded the world's largest installer of solar panels, Hamburg-based Conergy. Dimbach (Germany)-based Beck Energy designs and builds solar-power plants. And Christian Reitberger, a Munich-based partner at global private-equity firm Apax Partners, was an early investor in Thalheim (Germany)-based Q-Cells, the world's largest independent maker of silicon-based solar cells.

The keen German interest is no coincidence. With a 47% share, Germany is the world's largest solar heating market. The country's Environment Ministry subsidizes about 40% of the outlay for solar plants that heat drinking water. About one-quarter of NanoSolar's recent \$100 million financing consists of subsidies and incentives from various governments, including Germany's. Now, NanoSolar just needs to make all that support pay off.

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