

*Goldman Sachs gamble***Rebirth of two blade concept**

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A brave investment by Goldman Sachs is providing momentum to the American launch earlier this year of

Nordic Windpower, a company with plans to roll out its two-blade 1 MW wind turbine model in America and China before the end of 2008.

The technology originated in Sweden more than a decade ago but failed to find commercial success in its home market or the rest of Europe. An attempt to get off the ground in Britain in 2003 failed and in Sweden the company filed for bankruptcy in March 2005. Nordic has been knocking on America's door since 2004 (WINDPOWER MONTHLY, January 2005).

The company's initial failure was due in part to conservative investors, which scoffed at the two-blade approach as an unknown rather than an innovation, says Gunnar Fredriksson, director of the Swedish Windpower Developers Association. The domestic Swedish wind market has also been slow, making it doubly difficult for Nordic, he adds.

Two-blade machines are far from unknown from the 1980s and early 1990s, a period in which leading companies in the industry sold them in America and Europe. The most successful was the ubiquitous Lagerwey 75 kW out of the Netherlands, which sold in large numbers at home and in Germany. As wind turbines got larger, however, problems with the uneven loads of two-blade operation, plus public dislike of the visually disturbing effect of two-blade rotations compared with three, saw their disappearance from the mainstream market.

Nordic's two-blade design comes out of a 30-year, \$75 million investment by the Swedish government. Four Nordic test turbines are still in operation in Sweden, with one recently pass-



Flexible: Nordic 1 MW with two blades

ing 11 years in service with no major component failures and almost zero maintenance, according to Steve Taber of Nordic, now based in California. Taber says two blade op-

eration causes less stress on gearboxes and yaw drives than three blades. They can also be easier to install.

A widely cited drawback with two blades is increased noise. This is a relic of the smaller size rotor diameters that had much higher turning speeds, says Taber. The Nordic machine's rotor turns at a relatively slow 26 rpm. Noise levels of 100 dB(a) and 40 dB(a) at a distance of 330 meters are "virtually the same" as other turbines such as a typical Vestas unit, he says. The slower rotational speed is also more pleasing to the eye than earlier fast-rotating two blade designs with rapid rotation, adds Taber.

The nature of two blades, he continues, means the Nordic turbine naturally faces into the strongest winds. "We have a yaw drive like everybody else, but it might be used two times a day as opposed to 50 times a day for our competition."

According to Taber three blades won out not because the concept was better, but because it was easier to engineer. "What the Nordic design does is respond flexibly to load. That's the key to our advantages in terms of both cost and reliability. Reliability because the gearbox can really last a very, very long time and cost because it enables us to be lighter without sacrificing reliability. The fact that we are lighter and have fewer blades reduces our material costs, our manufacturing costs and our shipping costs." Nordic is zeroing in on a US manufacturing location, with assembly planned for the third quarter of 2008.

MAINSTREAM CASH

The Nordic machine may not be a mainstream design, but it has attracted mainstream cash. Goldman Sachs has invested an undisclosed sum in the venture in the most recent of its series of wind industry gambles. In 2005 it bought Zilkha Renewable Energy of Texas and grew the company into the third-largest US wind developer before selling it as Horizon Wind Energy to Energias de Portugal in July, reportedly making a profit of around \$800 million in two years. It has recently expressed an interest in selling off its shares in turbine company Nordex. "We like their style of doing business," says Taber. "They really understand how to position a company strategically for success in the industry."

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