Areva Wind, subsidiary of energy multinational Areva, designs, manufactures and assembles the 5 MW M5000 wind turbine that uses a hybrid, fully integrated generator-gear system.

"Most of the other turbine manufacturers will soon move to hybrid designs over direct drives," says Areva Wind CEO Jean Huby.

The fully-integrated system operates at medium speed and offers a compact design together with ABB's high-efficiency permanent magnet (PM) generator, which maximizes off-shore performance. This solution, Huby says, means the M5000 turbines will need less maintenance than other models. He proudly cites an overall availability rate in excess of 98 percent.

Reliability first
The medium speed gearbox does not need any fast-moving sections, only the slow rotating stage thereby improving the system’s overall reliability, especially at over 5 MW. Together with the ABB generator/converter package, the system is fully optimized for future advanced grid code compliance.

"Modern direct drive machines also run on PM generator units," says Raimo Sakki, R&D Manager of ABB’s wind power generators. The difference, he says, is that they are larger and heavier than their hybrid counterparts. By comparison, the generator in the M5000 has roughly 80 percent fewer active part components (magnet pieces and coils) than an equivalent 5 MW direct drive machine. "The fewer components you have, the more reliable your system," says Sakki.

A bright and windy future
By the end of 2013, Areva will have installed 120 of these turbines at two North Sea wind farms – Borkum West II and Global Tech I – each using ABB PM generators built specifically for offshore wind production. Along with the generators, ABB’s delivery scope also includes converters and switchgear. The ABB generator-converter package is medium-voltage (3300 V), another distinct advantage over competitors. “Ninety-five percent of all our competitors are working in a low-voltage range, meaning they have to handle big currents and suffer more electrical losses,” said Wilhelm Janssen, Head of the E-Power department at Areva Wind.

Efficient solution
"Permanent magnet generators have no excitation losses because magnets are used in the rotor instead of copper windings to create an excitation field. This makes the generator smaller and extremely efficient, especially with partial loads at low wind," explains Sakki.

But in order to maximize the benefits of the ABB PM generator, close co-operation with the turbine and gear manufacturers is needed to solve mechanical design challenges. "Areva has now got very positive field-tested offshore experience from this optimized ABB generator-converter system," says Adrian Zurbriggen, ABB key account manager for Areva Wind. Zurbriggen speaks of the common vision ABB and Areva have for jointly scaling up offshore wind power – beginning first in Europe and thereafter moving on to China and the U.S. “We are very glad to have a key customer and partner in Areva," says Zurbriggen.
Your reliable partner
ABB is a leader in power and automation technologies that enable utility and industry customers to improve their performance while lowering environmental impact. The ABB group of companies operates in around 100 countries and employs about 145,000 people.

In the wind power sector, ABB is the largest worldwide supplier of electrical solutions and the market and technology leader in generators, converters, circuit breakers/contactors, motors, transformers and HVDC.

ABB has supplied more than 30,000 wind power generators over the last 30 years, based on more than 120 years of experience in manufacturing motors and generators. Leading turbine manufacturers of all drivetrain types rely on ABB technology for induction, doubly-fed and permanent magnet generators. ABB offers solutions including inner or outer rotor direct drive, integrated medium speed generators and the flexible high speed platform. ABB introduced the first MW class PM generator for wind power in 1999. Most operating offshore turbines use proven ABB generators.