

Blown with the wind

Induction wind turbine-driven generators for environmentally-friendly power generation

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By the year 2020, it is forecast that the global population will have increased from today's 5.5 billion to 8 billion. This population explosion will in turn result in an over-proportional growth in the demand for power. The use of natural power sources to cover the energy demand, but at the same time, reducing environmental stressing is a global challenge. Siemens induction generators for wind turbines are favorably-priced and play their role in providing environmentally-friendly power.

shipped and commissioned worldwide.

Development continues

Today, many manufacturers of wind turbines prefer induction motors, operated at above-synchronous speeds. In close cooperation with these customers, Siemens developed its IIA6 and IIA8 induction generators. These generators emit low noise, and have a high lifetime and efficiency. Induction generators for wind turbines are essentially induction motors which are driven at above-synchronous speed by the

Trends in the use of wind to generate power

- Wind-turbine driven generators are seen as one of the most successful new technologies. In comparison with other markets, this global energy market enjoys the highest growth and export potentials.
- Today, wind-powered energy sources have an annual turnover of between 3 and 5 billion German Marks. By the end of 1996, 4300 wind-powered systems will be operating in Germany with a total output of approximately 1550 MW, and worldwide, over 6100 MW. In 1997, it is forecast that Germany will overtake the US in the international global league with 1617 MW.
- Up to the Millennium, Germany will have 3000 MW installed output.
- Worldwide, the wind-turbine market is growing annually by approximately 11%. While the European market with the main focus on Spain, is remaining approximately constant it is forecast that the Asian and American markets could double or even triple.
- In Europe, in addition to Germany, Denmark, England, Portugal and Greece are considered to be markets with a high future potential. In the Americas, especially Argentina, Brazil, Chile and the US represent the highest growth potential. In the Asia-Pacific area, experts are expecting increased utilization of wind power in China and India.

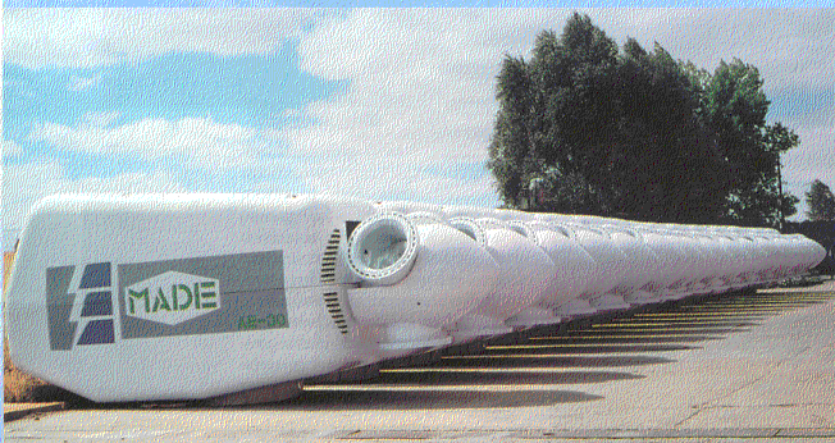


Fig. 1
Lined-up:
The housings to
accommodate the
induction wind
turbine-driven
generators and
blades

It is Asia and the emerging countries who, in the future, will be demanding cheaper power which is generated in a more environmentally-friendly fashion. Siemens induction generators for wind turbines represent a way of fulfilling this demand. Just 15 years ago, generators had ratings of between 10 kW to 30 kW. However, these have now increased up to 600 kW and in the meantime, 1.5 MW generators are no longer a rare occurrence. Well over 3000 generators in the output range up to 750 kW have already been

blades through gearboxes, thus generating power.

As the customer wants it

Together with our customers, a project team created future-oriented, customized solutions. This know-how is an important factor when it comes to continually improving the effectiveness, efficiency, quality and enhances the application possibilities for wind turbine-driven power generating systems. Even during the design phase, special significance was placed on implementing

specific customer requirements in order to maximize benefits.

- Special product benefits include:
- simplicity and ruggedness of the various components
- uniform temperature distribution as a result of the inner cooling circuit
- corrosion-protection for worldwide use
- insulating system with vacuum-pressure impregnation (VPI)
- reduced air noise using a two-circuit cooling system

The optimization of wind turbine power generating systems has a valuable impact when it comes to protecting the environment for future generations. The power yield can be further increased by using AC converters with active front end such as

MASTERDRIVES. Further, this technology enhances the line quality, e.g. during gusts and when switching in the generator to the line supply.

Wind power from the sea

The offshore area is becoming increasingly important due to the favorable wind conditions. After test results were evaluated, it was seen that at sea, the wind blows far more uniformly and stronger than had been previously thought. Experience which has been gained using banks of wind turbines – or wind farms – at offshore locations

Advantages of wind turbine-driven generators

- Wind turbine-driven generators use the forces of nature and save valuable natural resources.
- Wind turbine-driven generators have no emissions
- Wind turbine-driven generators play their role in maintaining emission regulations and are securing the future of the wind turbine business

Advantages at a glance

- High slip to minimize power oscillations
- Special bearing design to eliminate scoring when the turbine is stationary
- High efficiency, especially in the partial load range at low wind velocities
- Minimum bearing lifetime of 100,000 hours

has resulted in the fact that the actual power generation is between 20 and 30% above that which was originally forecast. The higher wind velocities of offshore locations had already been taken into account.

Since the increased significance of the offshore sector, and the new megawatt class technologies, the trend is quite clearly to higher outputs. The North- and Baltic Seas have become attractive locations for wind farms. For instance, Danish power companies are presently designing several wind farms which will be exclusively equipped with 1.5 MW turbines.

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Fig. 2
Especially designed for wind turbines: Siemens 1LA6 and 1LA8 induction generators

