

Tidal current power plants

An innovative type of renewable power plants

MOST of the currently known renewable energy technologies, such as hydro power, wind, solar, wave power or biomass use either directly or indirectly solar radiation and convert it into electrical energy. There is however another energy source which does not rely on the sun. The gravitational forces of the moon and the rotation of the earth are the origin of tidal flows, which can also be transformed into electrical energy.

Since the 60s tidal power plants have been in operation, impounding the water masses which flow periodically into a bay at high tide and release them at low tide to drive a conventional hydro turbine. This technology requires a large dam in the sea. Therefore, Voith Siemens Hydro is developing new dam-free tidal power plants, which do not extract the head of the retained water masses but instead, similar to a wind turbine, utilize the kinetic energy of the in and out flowing water. These power plants are therefore called "Tidal Current Power Plants".

To extract the kinetic energy more efficiently, preferred locations for tidal current power plants are concentrated in straits or locations between islands where the water has to "squeeze through" and thereby becomes accelerated.

Tidal current power plants could for example be turbine nacelles which are mounted on a monopile, extracting the kinetic energy of the in and out flowing water masses and transforming that into electrical energy. These innovative power plants could be operated fully submerged and hence produce renewable electricity without any visual



Tidal currents: An energy source for the future

PHOTO: DOUG WILSON/CORBIS

impact - a large advantage for the application of this technology in tourist regions, such as Norwegian fjords.

Due to the high density of water (in comparison to air), tidal power plants are significantly smaller than wind turbines, although the velocity of tidal flows is at approximately 24 meters per second significantly smaller. For comparison: While a one megawatt wind turbine has a rotor diameter of approximately 50 meters a tidal current turbine only requires 15 meters.

The biggest challenge of this new technology is the difficult accessibility - especially if the plants are fully submerged. Special lifting equipment and maintenances

ships that are frequently used in this harsh environment are very expensive and downtimes of the plant can reduce the economics tremendously.

Therefore, thorough engineering will be required to develop an essentially fault-free technology which can withstand this harsh environment.

"We at Voith Siemens Hydro, the leading supplier of conventional hydro power plants with 140 years of expertise for durable and reliable engineering, accept this challenge. With this new technology, we want to make another contribution to a sustainable and carbon-reduced future," says Dr. Hubert Lienhard, CEO of Voith Siemens Hydro.

Voith Siemens Hydro Power

Generation is a Group Division of Voith and -with a workforce of around 2,500 employees and an order intake of around 720 million Euro in the past business year- Voith Siemens Hydro Power Generation belongs to the worldwide leading companies for hydro power equipment.

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Voith is an official partner of the initiative "Germany - Land of Ideas."

Northern state has head start in offshore wind power

Wind parks in the Baltic Sea off Mecklenburg-West Pomerania could give a giant boost to the economy of Germany's northeast

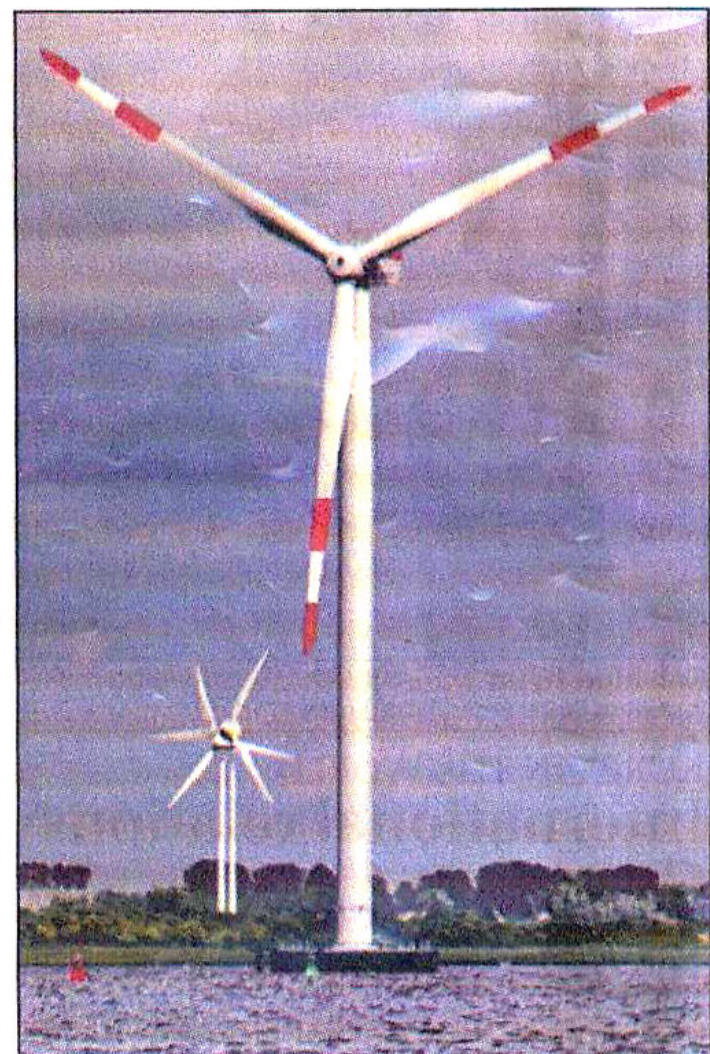
MECKLENBURG-WEST POMERANIA is top in Germany, at least when it comes to offshore wind power. The largely agricultural northeastern state has a head start in developing and establishing the new industry. "We've got the first two fully approved wind parks in Germany," said Andree Ifflaender from the engineering and project planning company Offshore Ostsee Wind AG in Boergerende. While other planned wind parks in the North and Baltic seas have received only partial approval, the wind parks Baltic 1 off the Fischland-Darß-Zingst peninsula and Kriegers Flak off the island of Rügen have been "totally approved" - from the wind turbines to the powergrid connection in Bentwisch near Rostock, Ifflaender said.

The April 2006 installation of Germany's first German offshore wind turbine, in the Breiltey estuary near the Baltic seaport of Rostock, was a big step forward. "The project was important because we gained experience for facilities planned out in the Baltic Sea," said Ralf Peters of Rostock-based Nordex AG, which built the wind turbine. Every phase of installation had to be done by ship. According to Peters, the Breiltey turbine has supplied about 1,800 households with electricity, which is not much compared with the wind parks that are planned. When they both go into operation, wind power will meet half of Mecklenburg West Pomerania's energy needs.

The Baltic 1 pilot facility, which carries a price tag of some 100 million euros, will comprise 21 wind turbines with outputs of 2 to 5 megawatts each. Construction is to begin in 2007. Starting in 2008, it is expected to supply some 57,000 households with electricity. Mecklenburg West Pomerania's offshore strategy depends on the success of Baltic 1 since the wind park Kriegers Flak, which is four times larger and costs 700 million euros, is set for construction off Rügen in the coming years. It is to provide electricity for more than 220,000 households. Kriegers Flak is far more complicated because of the greater distance to the mainland, the depth of the water and state of the seabed.

All parties involved have expressed confidence in securing the necessary financing and meeting deadlines for construction and operation. The recently adopted Infrastructure Planning Acceleration Act plays a key role here. It requires energy suppliers to pay for offshore wind farms' grid connections. "This substantially improves conditions," noted Christian Schnibbe of Bremen-based WPD, which specialises in capital investments in wind parks. The resulting 20 to 25 percent reduction in project costs could cushion the sharp rise in some prices for facilities and raw materials.

The new law could also compensate, at least partly, for the relatively low surcharge that German producers of



Germany's first offshore wind turbine park in the Baltic Sea

offshore wind energy can add to the electricity they feed into the grid: just over 9 cents per kilowatt hour, compared with 15 cents in Britain and the Netherlands. Wind power from the Baltic Sea will not simply burnish Mecklenburg West Pomerania's ecoimage. "Building and operating the facilities will create thousands of jobs," pointed out Matthias

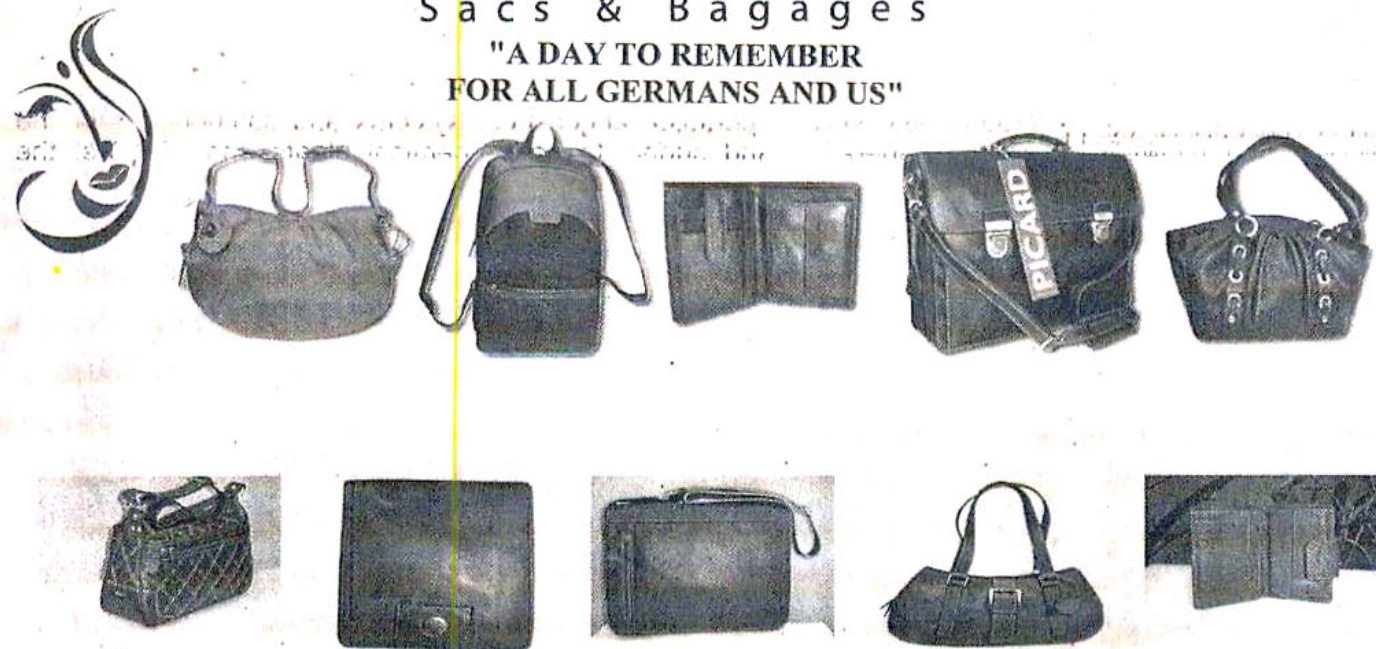
Hochstaetter, spokesman for the German Wind Energy Association (BWE). He estimates the Baltic's windpower potential to be about 2 gigawatts, which he said would attract about 5 billion euros in investment. "A gigantic boost for the economy," he remarked.

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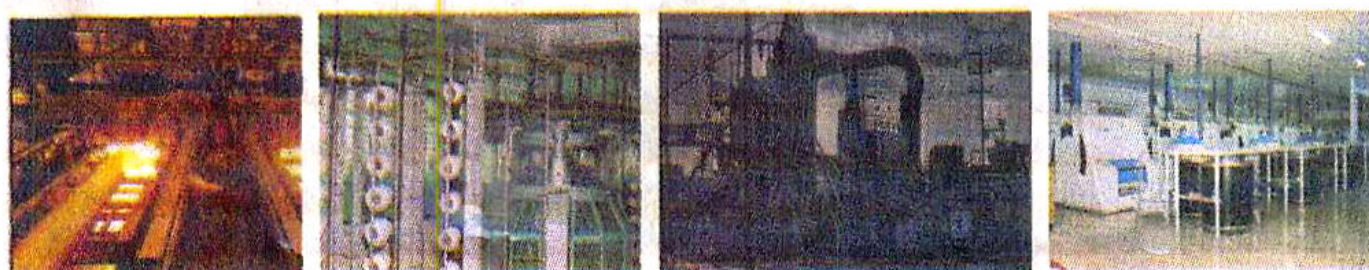
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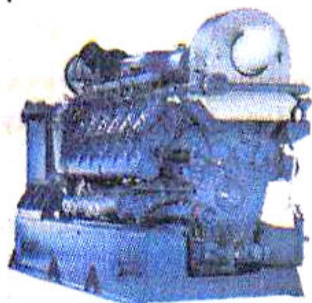
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