



## Energy from active breakwaters

**Wave power is one of the largest global energy resources, but is also one of the most difficult to harness. Wavegen, a wholly owned subsidiary of Voith Siemens Hydro Power Generation, started tapping wave power at the westernmost point of Islay in the Hebrides.**

This system utilizes wave power indirectly through the oscillations inside an onshore chamber connected underwater to the sea. When the water level in this chamber rises with an incoming wave, the air column above is forced out through a turbine, and when the level falls again, air is sucked in through the turbine (see diagram). In other words, the system “breathes” through the turbine in rhythm with the waves. But although

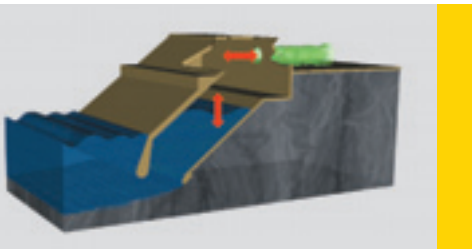
the airflow direction keeps changing, the turbine always drives the generator in the same direction – thanks to the ingenious turbine blading concept.

As nearly always, this concept was derived from Mother Nature. Apparently the inventor Alan Wells was inspired by the way the birds’ up and down wing strokes propel them in only one direction. So his Wells turbine does exactly the same thing the other way round: the turbine rotates in the same direction whichever way the air flows through it.

According to Voith Siemens Hydro estimates, global wave energy utilization potential amounts to at least 100 GW. As a next step, Voith Siemens Hydro plans to install this

innovative technology in existing or new port facilities and breakwaters, etc. to make the most of synergies: construction costs can be shared between the power plant and port facility operators. In nearly all cases commissioning and maintenance work can be carried out entirely on shore without incurring any costs for special marine infrastructures or vessels. Furthermore, grid connections from this onshore system are far easier and much less expensive. And very importantly: the Wavegen system has no impact on coastal environments.

Based on operating experience gained in the Hebrides, the first Wavegen plant is now planned in Germany as a joint venture between Lower Saxony Land and the EnBW power utility. Here again, the rated output will be 250 kW. A much larger Wavegen project with 3.5 MW rated output is currently under study for the Hebrides island of Lewis. This would supply enough renewable energy for about 2000 households.



*The oscillating water column pushes and sucks air through a Wells turbine.*

Photo: Stora Enso Baienfurt



## Voith Industrial Services implements OPM

### Operator Maintenance at Stora Enso, Baienfurt

OPM is an innovative maintenance concept to ensure optimal plant availability. It covers not only maintenance, but also inspection and troubleshooting.

This concept enables the operator to take over certain maintenance, inspection and troubleshooting activities, thereby improving working methods, reducing repair costs and increasing machine efficiency.

For OPM implementation, the Voith Industrial Services team divided the project into three phases over a one-year time span. A special training program was developed to prepare the Stora Enso production and logistics people for their new tasks.

The OPM activities will be analyzed in working groups and divided thereby into maintenance task packages with a view to activity planning by SAP in future. The goal of this OPM project is to create an innovative and modern working concept for the paper industry that will set benchmarks in the Stora Enso Group, when fully implemented.

## Voith Water Tractors will soon escort the biggest cargo vessels into the world's largest container port

### Shanghai Deepwater Port, currently under construction, will be the world's biggest container port when completed.

The location of Shanghai's new deepwater port – 32 kilometers off the coast – reflects the enormous dimensions of this infrastructure project. With a mean depth of 15 meters, Shanghai Deepwater Port will accommodate the largest container vessels. As of October 2007 Voith Water Tractors (VWT) will assist them in safely entering the harbor and tying up at their terminals.

For these two new VWT, built at San Lin Shipyard, Voith Turbo Schneider Propulsion is supplying four Voith Turbo Schneider Propellers size 28 (28 R5/210-2), four Voith 1330 DTL fluid couplings, and two control stands. Crew instruction will be taken over by a Voith training captain, and the Chinese shipbuilder will also benefit from Voith Turbo Schneider Propulsion design and construction know-how – after all, these 30 m long and 11.2 m wide VWT are custom-made for the new deepwater port. Powered by two 1,940 kW Yanmar diesel engines, their rated speed is 12.5 knots (about

22 km/h). They are also equipped with state-of-the-art firefighting systems. These two Voith Water Tractors will be equipped with the four Voith Turbo Schneider Propellers for decisive reasons: their safety and reliability, manoeuvrability and precision in tug and escort duty as well as for firefighting.

In October 2007 both Voith Water Tractors will go into service after completion in only one year. By then some of the 50 container terminals will be ready, and it is already clear that several more Voith Water Tractors will be required by the time Shanghai Deepwater Port is completed.

More than 800 Voith Water Tractors are currently in service at over 120 ports worldwide. The long-standing success of this concept is proved by the Alaskan Environmental Ministry's classification as "Best Available Technology" (BAT).