

## FORGEN 1000 Extreme High Performance Micro Wind Turbines



### Benefits

- Works in conjunction with solar panels
- Robust Vertical Axis machines
- Very extreme environment Cannot overspeed
- Intrinsically safe

### German Indonesian Tsunami early Warning System (GITEWS) uses the Forgen 1000 Extreme to assist offshore power management.

One of the crucial components of a tsunami early warning system is a reliable real-time data set providing information that can assist in determining the level of danger to affected coastal regions and populations. What makes the data more difficult to capture and use is the uncertainty surrounding the adhoc nature of tsunami producing events such as tectonic plate movements or submarine landslides as a consequence of earthquakes or volcanic eruptions.

To detect the tsunami wave front and the wave height, off shore instruments are essential. Offshore instruments are used to determine the sea level height and the deviation from normality (anomalies) with a high level of accuracy. GITEWS developed a series of offshore buoys to record a range of data such as GPS, air pressure and the water temperature. Furthermore the buoys are used as a relay station for ocean bottom pressure sensors, which are anchored on the ocean floor.

The buoys are equipped with meteorological sensors, movement sensors, a computer for data processing, a power supply unit with solar panels and the Forgen 1000Ex wind generator as well as with GPS and a satellite antenna for the communication between the buoys and a warning centre. The integration of these different sensors ensures the security of the system.

The deployment of 10 buoys is planned along the Indonesian coast line within the GITEWS project.

### BACKGROUND TO GITEWS

Directly after the disaster of the Sumatra earthquake of December 2004, the German Federal Ministry of Education and Research (BMBF) commissioned the Helmholtz Association of National Research Centre with developing a tsunami early warning system for the Indian Ocean.

A joint Declaration of BMBF and RISTEK, the Indonesian research ministry, formed the basis of the co-operation. In addition the Intergovernmental Oceanographic Commission (IOC) of UNESCO is also co-ordinating contributions from further countries to the overall system for the Indian Ocean.

For more information call **01275 795852** or visit [www.forgenrenewables.com](http://www.forgenrenewables.com)

Forgen Renewables Ltd. Enterprise Development Centre, Clevedon Hall Estate, Victoria Road, Clevedon, BS21 7RQ