Application of Aanderaa Current sensors in Marine Renewable Tidal Energy

Bluenergy Solutions is a hydrokinetic renewable energy technology solutions provider generating electricity from tidal currents and rivers. The company designs and manufactures hydrokinetic turbines and offers consultancy services to provide solutions for the integration of clean energy generation including storage and distribution. Aanderaa, Xylem is proud to have worked with Bluenergy in their Proof of Value (POV) project located offshore – near the Raffles Lighthouse on Pulau Satumu, about 14 km south of main island of Singapore (See Figure 1).

The purpose of the Project was to demonstrate, for the Maritime and Port Authority of Singapore, that Bluenergy turbines could provide and supply clean tidal energy to the Raffles Lighthouse. This would demonstrate the potential to replace diesel consumption with clean tidal energy, generated in the tidal currents found in the waters near Raffles Lighthouse.

The project utilized 4 Bluenergy tidal turbines mounted on a securely moored barge (See Figure 1 and Figure 2). The installation was designed to ensure easy removal from the water for maintenance and repair (See Figure 2). The operation of the project was fully autonomous, and its performance was also remotely monitored by the team on the mainland. The energy generated by the turbines was supplied to end user, by a marine power cable.

Aanderaa has supplied a system that consist of a Smartguard datalogger, current sensors (Doppler Current Sensors and Doppler Current Profiler Sensor) and meteorological sensors (See Figure 3 and Figure 4). Real time monitoring of surface to bottom current velocities and directions and weather data can be viewed through Aanderaa Geoview platform (See Figure 5).

Figure 1: Floating barge with turbines anchored at both ends for generating electricity.

Figure 2: Turbines hoisted out of the water for maintenance.

Field data can also be downloaded directly from the datalogger's SD card and viewed easily using free Aanderaa's DataStudio3D software (See Figure 6). With the velocity and direction data, Bluenergy is able to (i) deploy the turbines at optimal depth for electricity generation, (ii) assess the efficiency of electricity generated based on current water velocity and direction and (iii) plan and carry out timely maintenance and repair work on the turbines during low current velocities.

Figure 3: Datalogger, meteorological and current sensors are powered by solar power.

Figure 4: Single point Doppler Current Sensor (DCS) and Doppler Current Profiling Sensor (DCPS) housed in individual mooring protective frames to measure current velocities and direction at near water surface and in the water column.
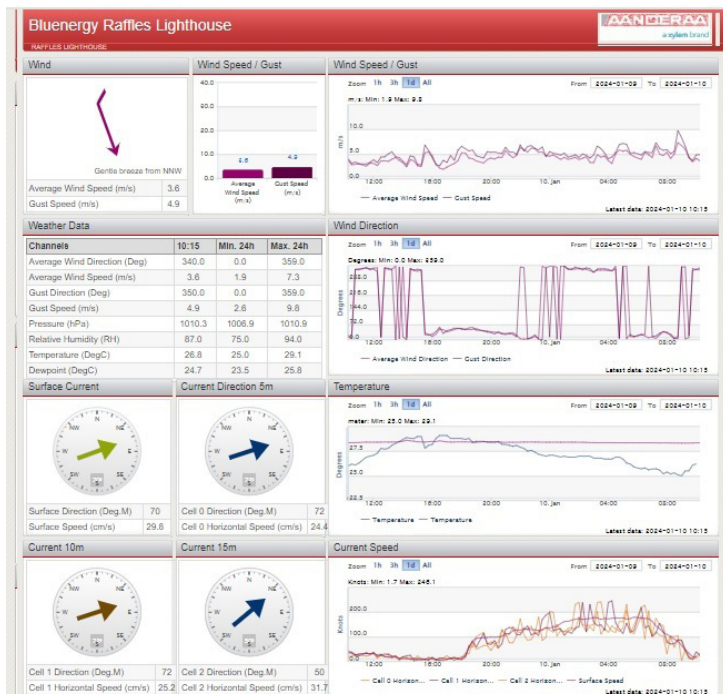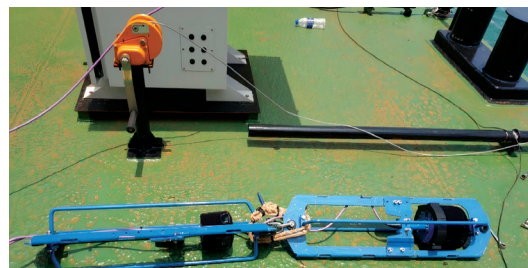

Figure 5: Screenshot of real time current and meteorological parameters displayed in Geoview IoT hosted by Aanderaa in Norway. See other example of live data with Geoview here.
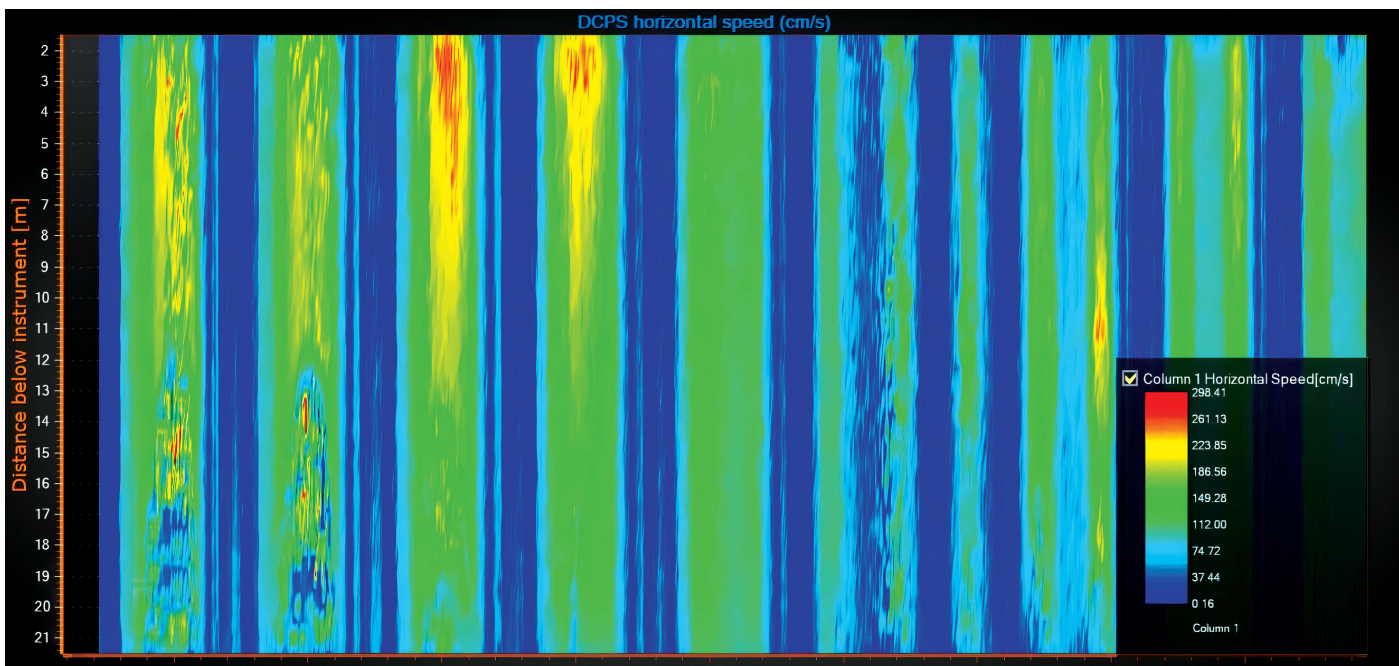

Figure 6: Within minutes, Aanderaa's DataStudio3D is able to plot temporal and spatial variations in horizontal current velocities within water column during monitoring period.

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