



## **Harvesting wind energy from the sea breeze in peri-urban coastal areas by means of small scale wind turbines – Case study: Viladecans, Llobregat Delta, northeast of Iberian Peninsula**

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Wind speed data recorded during 18 years (1993-2010) in the Llobregat Delta (15 km south of Barcelona city; northeast of the Iberian Peninsula) were used to assess the wind energy generated by off-grid small scale wind turbines (the IT-PE-100 and the HP-600W) for the whole year and for the sea breeze period. The computations were made using QBlade, FAST and AeroDyn simulation tools and manufacturer power curves. Using manufacturer data, the HP-600W with hub-height 8 m would deliver 157 kWh during the whole year (78 kWh during the sea breeze period), with an average power of 18 W (37 W). In this work, the results of the simulations are compared with power and energy production data measured in an HP-600W turbine installed in situ from December 2014 to April 2016. Also, the measured power is compared to the power obtained by applying the measured wind in the period 2014-2016 to the manufacturer power curve and the power curve obtained with the simulations. The results of the computations agree with the experimental data, thus validating the proposed approach for wind resource estimation. The feasibility of using a vertical axis wind turbine for obtaining wind energy from the local, thermal wind regimes is also studied. This research confirms that the sea-breeze is an interesting wind energy resource for micro-generation in peri-urban coastal areas where large-scale wind farms cannot be implemented.