

# The Small Wind Turbine Field Lab

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## Abstract

The emerging market of small wind turbines (SWT) is characterised by a large variety of turbine types as well as turbine performance. The abundance of more ‘exotic’ types of vertical axis wind turbines (VAWT) next to the more traditional horizontal axis wind turbines (HAWT) shows that this market is still developing. However, some technologies have proven to possess the same potential typically only found in larger wind turbines.

To study the (lack of) performance of current small wind turbine but also to demonstrate their potential, Ghent University decided to launch the Small Wind Turbine Field Lab (SWT Field Lab). This fully scientifically equipped field lab, funded by the Hercules Foundation, offers the possibility to not only monitor the energy yield of the turbine, but also collect information on how to optimise the grid integration, measure mechanical stress and structural strength of turbine components, assess the generator design and tower construction, perform acoustic measurements and finding ways to reduce noise production, even simulate siting of wind turbines, e.g. in rural areas or on industrial parks. All of these parameters are correlated with meteorological data measured on-site. The field lab, based in the inner port of Ostend, provides provisions for placement of up to ten small wind turbines, with seven turbines already partaking in the field trials.

The project members aim to use the project results to identify and remove performance limiting factors in the design of small wind turbine, and to demonstrate the feasibility of using small wind turbines for decentralised renewable energy production. With this and similar research projects, the emerging market of small wind turbines can grow beyond its current state of infancy, comparable to the market evolution of large wind turbines.

*Keywords:* wind energy, small wind turbines, SWT, field tests, energy yield, maximum power point tracking, grid integration, noise measurement

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