

Noise barrier-integrated micro wind turbine performance characterization with outdoor and wind tunnel measurements

Type of Project:

MSc Thesis or SIP-2 (size of work to be defined accordingly) at Process&Energy (Future Energy Systems Group)

DEADLINE : ASAP (experiments start in April-May and last until June)

Problem Definition:

The “Energy Wall” concept involves the integration of micro wind turbines on a noise barrier infrastructure in a reliable and effective way. A wind resource assessment conducted last year indicated the wind environment for the turbine to be exposed (1) . This year in April-May the wind turbine will be installed on the noise barrier site near Delft. A set of parameters will be collected, related to power, voltage, current, RPM, orientation, wind speeds, hub acceleration and other ones that are very useful in order to characterize the performance throughout this period. Therefore, a full system analysis and all of those parameters needs to be conducted.



Methodology:

- Literature review of micro wind turbine performance characteristics
- Accessing, collecting and classifying the data from the outdoor set-up with respect to several parameters (wind speed bins, wind direction with respect to the barrier)
- Assessment of the IEC-61-400-2 small wind turbine standard characteristics with the available data
- Aerodynamic and electrical performance of rotor, generator and inverter based on the assessed data
- Vibrational analysis – Fast Fourier Transformation
- Based on some preliminary outcomes of the analysis – Wind Tunnel measurements for all the aforementioned parameters (especially in yawed flow due to wind flow interaction with the noise barrier wind-fence alike structure)

Research Objectives:

- Characterize the micro wind turbine performance on the noise barrier and identification of areas of improvement or optimization for future projects

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REFERENCE

- (1) <https://www.researchgate.net/publication/320498165> Wind flow potential above noise barriers for urban wind turbine applications near highways