ENTRANCE
CENTRE OF EXPERTISE ENERGY

Wind testing VAWT Systems OmniWind

Client	OmniWind in cooperation with Hanze Wind Energy
Related project	PUMSWindT2, development of Small Wind VAWT Knowledge
Start date	June/September 2025
Suitable for training course(s)	Internship /Graduation project for Bachelor of Engineering, EMRE Master, or other MSc program, preferably mechanical engineering background with affinity for electrotechnical engineering (NI/Eng)
Learning Community	Wind Energy / system integration

Assignment description

Figure 1: 300 W HI VAWT TECHNOLOGY CORP.

Oil and natural gas accounted for 77% of the total Fuel consumption in 2018 in Netherlands. Then the share of electricity was determined to be relatively low as the Netherlands has a high share of gas heating, especially in the residential sector. Electricity covered just 16%, the second-lowest share among IEA countries in 2018 (source: "The Netherlands 2020"; International Energy Agency). Initiatives have been started since then, but this electrification should be further improved. Houses & offices are for not only this reason increasingly being fitted with solar panels but that is not enough as solar does not produce sufficiently when the demand is high (winters & night time). It is a good opportunity to complement the growth of solar panels with efficient urban wind turbines. Omni Wind is developing an efficient Vertical Axis Wind Turbine (VAWT) with a duct. Omni Wind (https://omniwindtech.com/) is a startup company based in the Netherlands. Their mission is to make cities more green and sustainable. They want to achieve their mission by developing off-grid renewable energy systems using their efficient hybrid wind turbine system

Hanze professorship Wind Energy is providing facilities and knowledge to Omni Wind, to help them with the development of these Vertical Axis Wind Turbines for already more than two years. At the ENTRANCE testing facilities already several testing prototypes were installed and tested. However there are still many questions to be answered. For this reason, Omni Wind and the professorship of Wind Energy are looking for students who are interested in helping in these developments via one or more graduation projects.

Assignment

In order to progress on the Omni Wind mission, Omni Wind and the professorship of Wind Energy conduct a project at ENTRANCE with support from students. Following are the main goals of the project:

- To field test the performance of vertical axis wind turbines and determine the power curve of these turbines.
- Based on the data calculate the annual power output for both turbines.
- Based on the calculated power output suggest suitable applications (e.g. electric vehicle charging, house heating etc). Prove by making the necessary calculations.
- Suggest methods to improve power output by implementing different duct designs, or different power electronics, generator design etc.
- Calculate the levelized cost of energy (LCOE) and cost of electricity for the end customer.

A Vertical Axis Wind Turbine with a rated power of 300 Watt has been installed at EnTranCe (see figure 1). Measurements are currently done. Data of the turbine must be further collected and interpreted. Also a computer model of the wind turbine is made with the intention to define turbine and duct design improvements via aerodynamic simulations. Now plans are made to develop a larger size vertical axis wind turbine prototype

Previous students have worked together with OmniWind on following steps

1. Continue tests with the VAWT to assess the performance characteristics (Quantify the performance characteristics of the turbine).
2. Plot the best possible power curve based on data obtained
3. Make a comparative analysis of the turbine with possibly other turbines (Compare the performance and possible technical issues)
4. Make the calculations mentioned in the goals section (Open to suggestions from students to improve the project results).
5. When required, support or continue work on aerodynamic simulations of the wind turbine, to define further improvements.
6. Define whether new prototypes need to be installed for additional tests on-ground location (2-3 m from the ground)

For the continuation of this project, following activities are now described:

1. Analyse the current status of the gathered data
2. Methodically design a frame for a new prototype, define the boundary settings (e.g. budget, location, tower height, etc), evaluate the findings with the stakeholders
3. After approval from OmniWind, start executing the building of the new prototype and possibly a scale model
4. If possible, execute (wind tunnel?) performance tests

General information

Final Product	To successfully complete the projects, the following possible steps can be considered, for example: •Literature and experimental research and interviews with experts/partners (important source reached is: “Long term research agenda of the European Academy of Wind Energy” and “Current status and grand challenges for small wind turbine technology”) •Research and advice report with measurement results • Design/simulation of the proposed and actual building of pilots •Actual measurement and testing
Location	ENTRANCE
Parties involved	Omni Wind, professorship Wind Energy
Contact person	Pranav Tetali (Omni Wind), Arjen de Ruijter (professorship Wind Energy) a.de.ruijter@pl.hanze.nl
Guidance	Process guidance from the professorship Wind Energy, expertise guidance from company Omni Wind
Details	

Information about Omni Wind can be found on their website: https://www.omniwindtech.com/

What are we and where can you find us?

EnTranCe is a learning knowledge community, in which students and teacher researchers from various programmes work together with researchers, companies, governments and civil society organisations to accelerate the energy transition.

EnTranCe is the place where, as a student, you work together with lecturers, researchers, businesses, governments and/or civil society organisations on complex issues. We do this at the following locations:

- Location Proeftuin, Zernikelaan 17

- Location Energy Academy Europe, Nijenborgh 6.

What do we offer?

EnTranCe offers you a multidisciplinary, inspiring learning, working and research environment in which you can develop the competencies needed to shape and accelerate the energy transition. There is room for collaboration with professors, researchers, lecturers and the professional field. In addition, you will be supervised by professionals who are part of the EnTranCe Learning Communities (ELC).

Contact us

Are you interested in the vacancy? Do you have questions or would you like to apply directly?

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