



## Assignment student EnTranCe Energy Transition Community

**Project title:** Small Wind Turbines/Fortis 2/ Generator system optimization

**Suitable for students of:** *Multiple choices are possible*

- MBO
- Buiten Werkplaats Built Environment (2<sup>nd</sup> yr, 1 block)
- Vastgoed lab V&M (3<sup>rd</sup> yr)
- Bachelor graduation assignment (4<sup>th</sup> yr)
- Bachelor internship (limited possibility in daily guidance)
- Research assignment in curriculum year.....
- Honors research assignment
- Master thesis

**Study Program:** Ba/ Ma Electrical/Mechanical/ Mechatronic Engineering, EMRE, Physics, Aeronautics ,or equivalent.

**Period:** 2018

**Language:** English, Dutch, German

**Client:** Fortis Wind Energy; Ir. J. Kuikman; [www.fortiswindenergy.com](http://www.fortiswindenergy.com);  
kuikman@fortiswindenergy.com

**Internal client:** EnTranCe; RAAK-MKB Project PUMSwindT; Ir. R. A. Alberts;

### **Background (facts, situation sketch and parent/organization goals)**

Fortis Wind Energy is a company that produced hundreds of Small Wind Turbines(SWT) over the last decades and installed these wind turbines all over the world. There are three sizes available:

- F1; P=1,5 [kW]; E(electr)=ca. 1.500 [kWh/y]; D(rotor)= 3 [m]; C(F1)=ca. 8.000 [€]
- F2; P=5,0 [kW]; E(electr)=ca. 5.000 [kWh/y]; D(rotor)= 5 [m]; C(F2)=ca. 20.000 [€]
- F3; P= 10 [kW]; E(electr)=ca. 10.000 [kWh/y]; D(rotor)=10 [m]; C(F3)=ca. 40.000 [€]

### **Problem (description of the undesirable situation)**

Because the price-performance of Solar PV- and big wind turbine(BWT)-systems went up the last decade where that of the SWT didn't. So the market position for the SWT marginalised, except for some niche markets, like rural stand alone farms.

SWT manufacturers did not have the capabilities and capital of the BWT manufacturers so couldn't keep up with the latest scientific insights and lagged behind.



With regard to the SWT Generator system, the situation is not optimized and the expectation is that more efficiency and functionality is possible. With the HG Motor Test System a measuring system set up is needed to check the Generator efficiencies for all possible operational SWT situations thinkable. The functionality of the Generator system can be a problem due to different customer specifications, like for electrical output: 1-24 [V], 2- 48 [V], 3- 230 [V]/ 50 [Hz]. A Generator system design with the most flexibility is desirable.

### Objective (description of the desired situation)

Research all relevant aspects of the energy production of the generators for SWT and design a theoretical optimal Generator system for the different Fortis SMT: F1, F2, F3.  
Make an optimised prototype for the three Generator systems ( F1, F2, F3)  
Test the prototypes and verify the test data with the theoretical performance  
Write a Ba/Ma report, with all the relevant project data.

### Result deliverable/product (what is ready if the project is finished) with list of part results

A theoretical model for designing an optimal Generator system  
Optimized redesigns for F1, F2, F3 as well as production of Prototypes  
Design of a test set up for the prototypes and validation.  
A Ba/Ma report, with all the relevant project data.

### Competence level

3

### Connected to Change Agency ETC

*Multiple choices are possible*

- Sustainable Building
- Sustainable Mobility
- Local Communities

### Interested or further information

You will be working in a multidisciplinary team. For detailed information on this assignment contact A.S.J. Joosse(EnTranCe), [etc@org.hanze.nl](mailto:etc@org.hanze.nl)

### How to respond to the vacancy

Send a motivation letter and CV to EnTranCe, Energy Transition Community, [etc@org.hanze.nl](mailto:etc@org.hanze.nl)  
Attn. Mrs. Jacqueline Joosse, Office Manager EnTranCe. Note: If the job does not fit directly with your specific interest, please visit our website to discuss other possibilities.

Website: [www.en-tran-ce.org](http://www.en-tran-ce.org)