

Wind-energy system Vertigo worldwide premiere

If all goes well, by the end of 2012 the Vertigo building of Built Environment will be the first in the world to have a wind-energy system installed that's integrated in the building's construction. Expectations are high: the system is supposed to generate more energy than any other system currently available.

The office of Italian dr.ir. Rosella Ferraro on floor 9 is situated right under Vertigo's roof, which is where it's all about to happen later this year. The researcher for 'Renewable Energy in the Built Environment' has worked with dr.ir. Alexandra Suma in Miami in 2008 and 2009, a TU/e alum and inventor of an integrated wind-energy system bearing the working title IRWES: the Integrated Roof Wind Energy System. Both Suma and Ferraro came to TU/e to further develop and expand on the concept. The Italian researcher was awarded a European Marie Curie Grant, enabling her to conduct research at a host institution of her choice. IRWES is different from 'normal' wind-energy systems in one important respect, Ferraro explains. Usually, wind turbines are used, but these have the disadvantage of being heavily dependent on the weather and their built surroundings. A wind turbine starts working at 3.5 meters a second. However, at some 2 meters a second the average wind velocity in the built environment in the

Netherlands is less. "There's a reason windmills in the countryside aren't spinning a lot of the time", the researcher illustrates. The solution: building a system around the turbine. The idea is that wind is collected by so-called louvers and funnels (channel system with horizontal panels). The major upside to this setup is that wind pushed through the constriction, accelerates. "In physics, this is called the venturi effect", Ferraro explains. The turbine has an accelerated drive that generates a relatively large amount of energy. The plan is to store the energy and use it in part of Vertigo. The exact amount of energy that's released and the maximum wind speeds IRWES can handle has yet to show from measurements, and Ferraro is reluctant to provide any hard numbers. Still, she can give some indications: the system should generate more energy than an average family home uses. And a business plan designed by students Stefan Suntjens and Nicolas Nelson for the certificate program Technology

Entrepreneurship shows construction requires an investment of some fifty thousand euro, costs that should be recovered after ten years. IRWES' life span should be at least twenty years. Ferraro calls IRWES an 'open sky lab' - a laboratory in the open air. The system will be used for education and research. For example, we may gain more insight into the workings of air currents, and the use of wind turbines can be optimized.

IRWES should recover its costs after ten years

With the project, the research group wants to take an internationally prominent position in the field of scientific activities regarding wind energy in the city center. It's no coincidence the system will be located on the roof of Vertigo: the building is facing southwest and knows a relatively high exposure to wind, there are few surrounding buildings blocking wind, and Vertigo has a high visibility from both the city and campus. It's also 'an easy location' to build, says Ferraro, stressing the quotation marks. After all, relatively easy as it may, it's certainly no picnic. There's the hassle of paperwork,

working with the design and last but not least: taking into account the technical aspects and logistics. The research process knows many aspects, which is why the team consists of members with various skills. Suma is mostly focused on the business aspect, while Ferraro concentrates on the scientific side. Dr.ir. Faas Moonen works on logistics, coordination and practical issues. Master students Rianne Dekker and Adelya Khayrullina are studying the best way for IRWES to be placed onto the roof, taking into account aerodynamics, the Vertigo design, and the building's structure as a whole. Student ir. Rubina Ramponi is working on the design. DH will take care of all the necessary paperwork, including a stricter safety policy. In the near future, the group wants to involve more students in the project as well.

Last year, Technology Foundation STW awarded the project with a 250,000-euro Valorization Grant. The Anniversary Award the group was presented with last September also brought in extra money. And because of the university's 55th anniversary, University Fund Eindhoven (UFe) made available 55,000 euro, part of which went to IRWES for winning in the category 'energy'. At the time, director Rick Harwig of the Energy Research Cluster said their idea is "an elegant combination of an architectural solution and efficient, clean energy supply". Right now, a prototype of the wind-energy system is pretty much ready for testing, and it's expected to be done in Maastricht later this month. TU/e has access to an open field over there, enabling researchers to test the effect of wind in the very best of conditions. Based on test results, the group will start working on improvements, and after that the system is scheduled for the roof of Vertigo, which will probably be by the end of 2012. In the meantime, Innovation Lab is helping the group with the startup of a company to commercialize their invention, and the researchers will be checking whether IRWES may be integrated in other TU/e buildings as well. (JvG)

Check www.irwes.com.



An impression of Vertigo with IRWES on top of the roof.