STOW

Small Wind Turbine Optimized for Wind Low Speed Conditions

PARTNERS

Military University of Technology
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Department of Mechanics
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University of Agder
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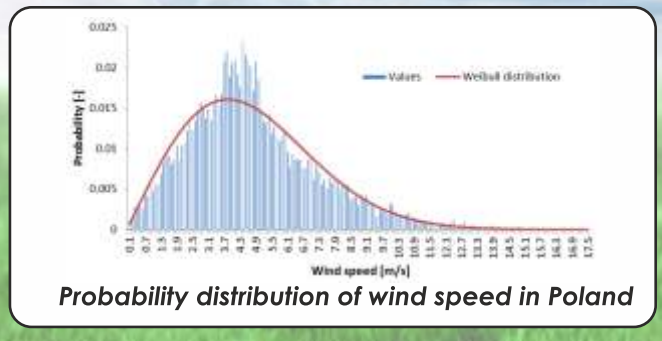
DONATOR

Through the Norway Grants and EEA Grants, Norway contributes to reducing social and economic disparities and to strengthening bilateral relations with the beneficiary countries in Europe. Norway cooperates closely with the EU through the Agreement on the European Economic Area. For the period 2009-14, Norway's contribution is €1.7 billion. Grants are available for NGOs, research and academic institutions, and the public and private sectors in the 12 newest EU member states, Greece, Portugal and Spain. There is broad cooperation with Norwegian entities, and activities may be implemented until 2016. Key areas of support are environmental protection and climate change, research and scholarships, civil society, health and children, gender equality, justice and cultural heritage.



Probability distribution of wind speed in Poland

POLISH-NORWEGIAN RESEARCH PROGRAMME

norway grants

The National Centre for Research and Development

www.stow.wat.edu.pl

STOW is a project conducted within the Polish-Norwegian Research Programme that aims at development of the small wind turbine optimized for low winds.

Time scale 01.10.2013 – 30.11.2016

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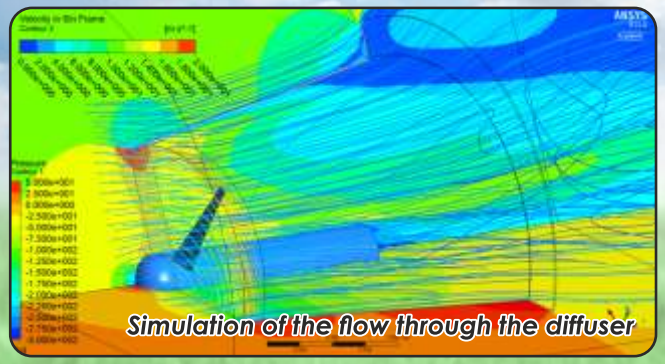
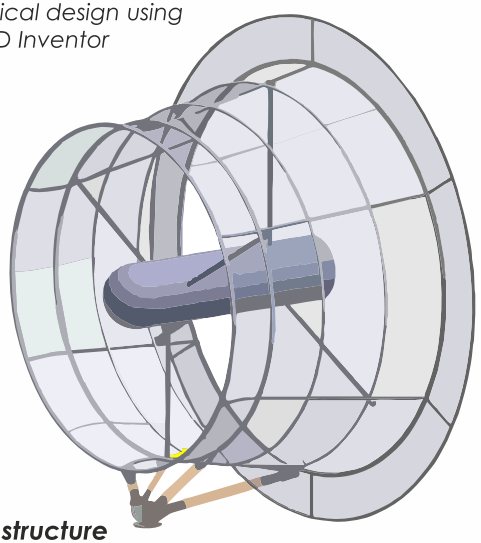
The STOW project aims to contribute to the development of cutting-edge technologies which can be transformed into marketable results on the still more important field of green energy usage. Optimized STOW design can be a good base for future works aimed towards building of prototype and engagement of businesses interested in introducing of the new product to the market. Another effects of conducted work will be scientific proof that SWT running inland can be an efficient source of energy. This sole statement gives a powerful argument for fighting big energy players constantly obstructing SWT concept by rising its low *Return On Investment*.

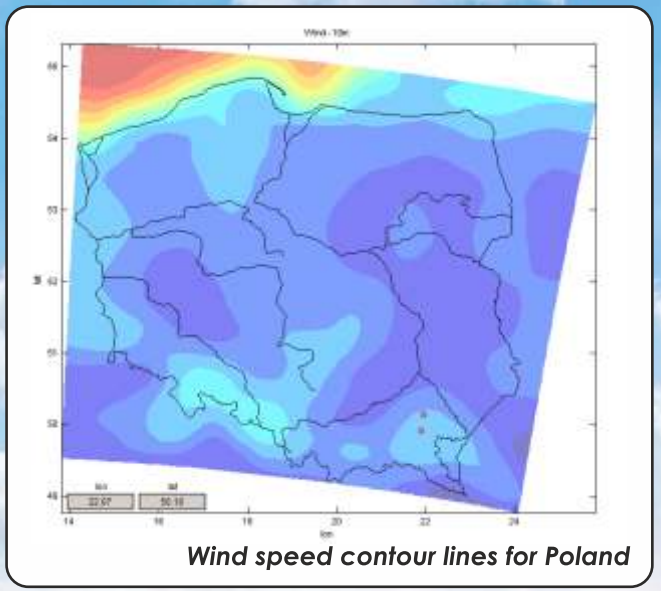


Simulation of the flow through the diffuser

Mechanical design using AutoCAD Inventor



Diffuser structure



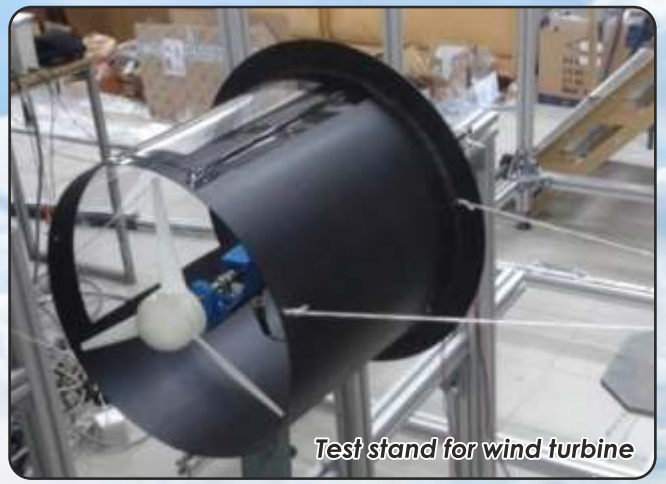
Wind speed contour lines for Poland

BACKGROUND

In December 2010, Poland submitted to the European Union document called National Action Plan for the promotion of renewable energy sources. In this document, for the first time officially, small wind power (up to 100 kW) was pointed out as a separate branch of energy sector. It was assumed that by 2020, this branch will produce 550 MW of power, which means, on avarage,100 thousand of small wind turbine (SWT) installations. Given the current legal status, technical advancement and the number of companies that actually (and not just declaratively) offer SWT – objectives of the Action Plan should be considered very ambitious, to say the least. Various reports on the state of small wind energy sector indicate the main obstacles to the rapid popularization of this form of energy conversion. These barriers can be divided into three basic groups:

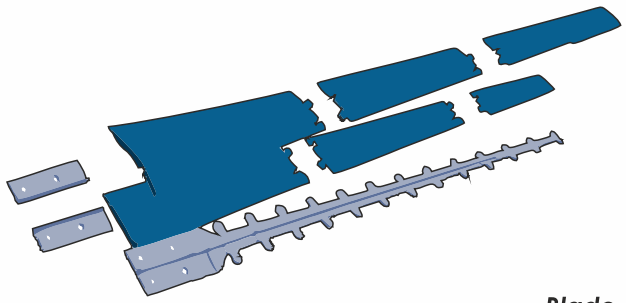
- formal-legal issues, i.e. legal environment incompatibility with the concept of SWT,
- socio-economic problems,
- technical problems.

The most common small wind turbines (SWT) market offer: 3-blades horizontal rotor usually works best at wind speed of 8–10 m/s, while typical wind speed in Poland is 3–6 m/s.



Test stand for wind turbine

The objective of the project is to develop SWT layout better suited for low wind speed. The new design will help to popularize usage of renewable energy sources among individual users thanks to improved SWT *Return On Investment*. This will be possible by presentation of technical project of efficient small wind turbine with inclusion of conversion system schematics, being proof that SWT running inland can be an efficient source of energy. New design will be beneficial for each party of SWT market i.e. makers, sellers and end users.



Blade