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ENERGY RENEWABLE SOURCES IN HIGHER EDUCATION RESEARCH MANAGEMENT

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Abstract: *Paper subject underlines possibility to develop unconventional and non-pollutant energy sources with the respect of economic law in sustainable development conditions. It emphasizes the necessity to implicate higher education research team (in multidisciplinary approach), business environment and whole society in energetic problems. Politehnica University of Timisoara had and has such teams. Authors are focused on energy renewable sources in theory and practice such as wind energy project designing Aeolian turbine and its implementation in Marga community, for help Medical Christian Association "Izvorul Tămăduirii" to become energetically independent. Authors' intentions for future are focused to obtain project in solar energy, hydraulic energy and biomass energy for this community and to extend the research and results to others communities.*
Key words: *sustainable development, ERS, management*

1. INTRODUCTION

In the frame of sustainable development energy question is a very fashioned one especially because of energy real necessity. Human rase must find viable energy solutions of living if it want to survive and university must have more and more preoccupation and implication in this field (Vartolomei et all, 2010). The respect for solidarity between generations represents a real constraint for the industrial, economical and political actors. In this context to develop and reorganize energy system has foreseen in the regional development plan and in the framework of energy infrastructure, also to discover energy renewable sources – Aeolian, solar, hydro energetic, biomass (Ambros, 1999) – and to develop methods for their settlement (wind-mill, Aeolian turbines, solar light and warmth catching, hydro-electric power station, solar-electric power station) (Lazarescu, 2003). They represent a real necessity in the current world challenges. The New Europe Policy for Energy aims at some daring goals: renewable energy share by 20% of total energy; biofuel share by 10% of fuels used by motors; carbon dioxide emission decrease by 20%; energetic efficiency increase by 20%, and so on.

Aeolian turbines are considered generally a cheaper alternative for energy production than photovoltaic systems, in the region with upper 4 m/s of wind blow, even if Romania has a higher potential for biofuel production and exploitation.

2. WIND ENERGY OVERVIEW

There are several achievements in this field in Romania: Tihuta (Bistrita), Ploiesti (Prahova), Baia and also recently in Topolog (Tulcea) and Corbu (Constanta).

Several years ago, there has been an attempt to build an Aeolian turbine on the Semenic Mountain, however this is currently not functional. That project has been coordinated by the "Politehnica" University of Timisoara, in cooperation with RENK Resita, ICEMENERG and ELECTROMONTAJ.

The team from Timisoara has exclusively focused on aggregates equipped with horizontal axis turbines and they have promoted, from the beginning, a multi-disciplinary approach by involving teachers, specialists in the projection of hidro-energetic equipments, and those from the energetic development area. This way, on the Semenic Mountain, there were four aeroelectrical aggregates, in different testing phases, with an installed power of 1,200 kW. The main conclusions of the experience gathered on Semenic showed that the location can be compared with other European locations of this type, classified as good and very good, but maybe there some lack of inspiration. Eolian turbine of Tihuta, the first of this type that provides national energy, has an installed capacity of 250 kW. The investment for building it was around 260,000 EUR, and the production was about 186,000 kWh in 2005. The manufacturer also owns green certificates (a system that promotes the production of energy from regenerable sources), that are added to the incomes earned by selling the electric energy.

The controversies regarding the eolian turbines are linked to the landscape impact and the impact on birds.

At an international level, fields of eolian turbines are known in the following countries: Canada, The Netherlands, Germany, Austria, respectively the areas from Island and Denmark or the areas from Italy, Czech Republic sau Slovakia.

The trend of contributing with eolian energy to satisfy the worldwide necessities is in continuous growth, based on the latest research. It's estimated that in 2010 it will reach about 500 TW/h/year, and in 2020 it will reach 1,000 TW/h/year. Also, it is estimated that the requests for eolian electric energy will go beyond the classic method of energy produced from fosile fuels (coal, oil, gas), respectively hidro or nuclear (Anton et all, 2007). Only the energy produced using biogas, solar and geotermal will go beyond it.

3. UNIVERSITY ENERGY PROJECT MANAGEMENT

The project coordinator is "Politehnica" University of Timisoara because its experience of more 25 years in this field. The project team is interdisciplinary one with engineers (specialists in energetic and Hydraulic machinery and equipments, automation), statisticians, mathematicians and economists.

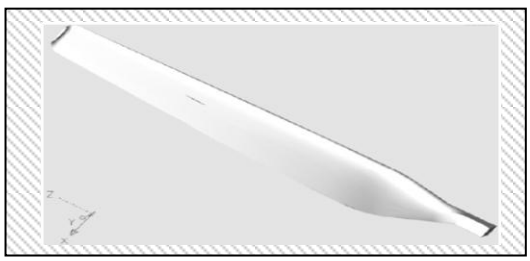

Fig. 1. The blade for wind turbine designed in CATIA program

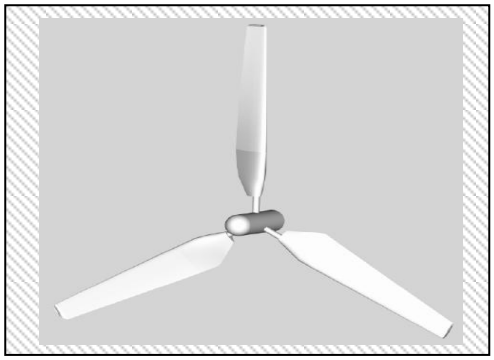

Fig. 2. The runner of wind turbine (3 blades)

The partners are: University from Oradea (another Romanian University for processing the database provided by settlement windmills monitoring of wind), SC Clagi-Romania SRL (Small and Medium Enterprises specialized in manufacturing technologies for Polyester Reinforced with Glass Fiber (PRGF) products and panel type "Honey Comb" phono and thermal insulating – it has great experience in foreign project cooperation); Medical Christian Association "Izvorul Tamaduirii" **(**MCA-IT – a non-governmental organization representing the project's beneficiary).Following a research project between a team from "Politehnica" University of Timisoara and the beneficiary, a Canadian company, another horizontal axis Aeolian turbine has also been developed at S.C. CLAGI SRL.

The first stage started in 2007, when the coordinator decided that the Aeolian turbine should be horizontal type one, because it suits best to the weather conditions at the designated location (wind velocity between 2-6 m/s), depending on the optimum efficiency of the wind turbines and the building possibilities of the manufacture plant, CLAGI SRL.

Project's objective is to realize an Aeolian turbine with the following features and to adapt the technology of wind energy to the local conditions: nominal power by 3,5-4 KW (instalated to generator terminal); turbine diameter by 4,5-5 m; annual energy produced by almost 3.700 kWh/year (for location with average wind velocity by 4,5 m/s), the energy for average wind velocity by 3 m/s is about 1.500 kWh/year, and for average wind velocity by 6 m/s is about 10.000 kWh/year; material for blades (figure 1) is PRGF; oriented through the wind with driftway with elastic system; valorization of electric energy through inverter, AC-220 V; the runner of wind turbine with 3 (figure 2), 4, 5 blades; speed of rotation (100-160 rpm); chord of profiles in active zone (200-380 mm). These objectives emerged from an existing necessity to help MCA-IT to become energetically independent.

Next phase of blade construction was to create the 3D solid in AutoCAD Mechanical Desktop so the derived file was to be used in the machine program from the collaborator factory. The adjustments in this phase justify using the CAD techniques (Milos, 2009). Final check is made with 3D representation.

Finally the blade of wind turbine will be tested for verification of static mechanical resistance, tested in terms of aerodynamics in an aerodynamic tunnel and then assembled to be tested in real operating conditions.

This project will be finished in 2010, but during the entire project, there were a feed-back between the consortium entities about each problem that occurred (both in legislation as well as financial problems – the funds decreased in last year). This leads to an excellent managing force, a very high professional competence of the entire team which concurred to the project's realization and also a high social competence.

In the final meeting, there must be a statistic appreciation of the entire project, presented by its coordinator and also a list of open proposals for the future. Our project will be completed in 2010. Further information is posted on the project website.

4. RESULTS

Using some methods such as: blade of a wind turbine with variable geometry, twisted in space, heaving metal embedded at the catch extremity in runner hub, flap from 90 degrees in the peripheral area for reduced noises and the effect of finite span etc., we discovered it is required a special study to find the best solution according to facilities and opportunities of the manufacturer. Following some steps, PRGF technology was adapted by Clagi SRL, in order to set wind turbine blade. The main result of the project consists in adopting new manufacturing technologies, special procedures in order to obtain competitive product on the market with growing demand and to adapt technology standard to a complicated product.

Also, the results give possibilities to set the requirements for aerodynamic wind rotor and their methods of solving are becoming more diverse. The results become important not only aerodynamic, hidrodinamic and mechanical, but also construction, technological, economic issues (Milos, 2009).

The content of the work is original and patentable (a targer of the project members).

5. CONCLUSION

The limits of the project are linked with project's deadlines (very short and strictly), terms and financial support (it was reduced because recent world economic crise). This project have great impact on technological (new manufacturing technology: PRGF), economical (cheaper costs) and social environment (energetic independece), because the project'results can be applied everywhere, with specific adaptation and can contribute to a real regional sustainable development. But the main target of the paper is to emphasize the importance of Romanian actors (NGO, government, business environment, civil society, but especially higher education research centers) to be implicated in European projects on energy field and to act upon one anothers.

6. ACKNOWLEDGEMENTS

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