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## Time for change! Decentralized wind energy system on the Hungarian market

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### Abstract

The purpose of the study is to focus on finding new ways at the Hungarian wind energy market by concentrating on Small and Medium Wind Turbines (SMWTs) and to nominate barriers what Hungarian wind energy innovators find. The current technology regime, working systems and Blue Economy solutions will be investigated. This topic constitutes an important area, because a necessary technology transformation let new markets to emerge. Based on Deutsch [1] technology regime researches and Painuly [2] framework of renewable energy technology barriers, due to the Hungarian technology regime will be identified. The solution seems to emerge as part of a different technology regime, other than the energy industry, which considers SMWT technologies as a complementary source for core businesses. The study provides a holistic view on the Hungarian market and equip with probable solutions.

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### 1. Introduction

Climate change became an influential factor to foster the replacement of the current fossil energy sources. As an answer to the EU 2020 Millennium goals, Hungary has worked out an energy efficiency plan for 2020 which is based on 4 pillars: energy saving; increase the renewable and low carbon emission energy production; redesign the central heating and individual heat production; and green industry/agriculture. In our study the second and fourth pillar is important. Hungary is going to increase the renewable share in the primer energy consumption up to 14.65% by 2020 [3]. This proportional number is due to Hungary size. Today the preferred renewable energy sources to produce electricity are biogas, hydro, waste burning and wind energy in our country [4]. Utilizing wind energy is favored by the

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Hungarian government; however practical experience shows lack of support and public acceptance. The reason may hinder in the centralized and decentralized energy systems.

Lovins [5] emphasized in his work that centralized energy systems has been dominating historically from the 19th century due to the resulting cost savings and improved reliability. One of the main features of a centralized system is that it is very expensive to construct, but potential individual problems are less in magnitude (more economical to maintain). It is easier to reach an agreement on locating the power plant as there is only few in a country. Decentralized systems' costs are not lower, the individual problems may be multiplied and they should be close to the residential or consumer areas. Both systems are similarly exposed to climate events and any kind of disruption. But a very strong argument for the centralized system is that in case of a blackout, it is expected that problems are going to be restored by the major utility service. However a decentralized community would be left alone. Same might happen when support is needed. On the contrary, the centralized systems' blackout could be big in magnitude, affecting large areas for a long time, while decentralized systems are much less in magnitude. Traditionally, government stands behind a centralized energy system, therefore making it more reliable. [5] [6] [7].

Lovins [5] forecasted that by 2050 the major monopolist business model to provide electricity is going to be diversified. It will shift slowly from a centralized to a decentralized system. It will involve more renewable combined with flexible fueled generators and demand response. The vision is while wind peaks during night, solar at daytime, it can provide constant electricity while geothermal-biogas can balance out the system. Drivers for change are observable, like the growing need for renewable energies, innovation of smart grid technologies, grid flexibility, which set new directions for electricity market. Large-scale installation of renewable energy creates benefit for centralized system, and their small-scale applications are regarded as decentralized. Hence horizontal axis wind turbines (HAWTs), like large wind parks belong to the centralized energy systems. The growing need for HAWTs will drive the cost down for the technologies and accordingly SMWTs will be cheaper for local generation. Smart grid system will be more open for centralized renewable energies; consequently will connect in the future locally sited generations more easily. As a result consumers will have a chance to join the electricity production, and save energy and money at the same time [6] [8].

The old monopolistic business model is obsolete and the market is looking for a customer centric, diverse system with a more competitive market. For example the small and medium wind turbines have already success in rural electrification projects. In China the first SMWT was recorded in 1980 and until 2010 there were 400 000 turbines counted. According to the Alliance for Rural Electrification the price of SMWT is cheaper than small-scaled PV or mini-hydro and any other system [5]. The wind turbines have multiple benefits; however there are barriers which set back the soundness of the system. This fact is detailed later.

Blue Economy concept founded by Gunter Pauli [9] is based on an extensive research which looks for a new business model for the world ever increasing problems. It thinks in auto-poetic systems which can constantly change itself. The key is to force the system around us, then the system will adapt. The old, regulated schemes are not tolerable in the aging European society. It is time for change. An open system should trust local communities. Energy generation should be produced at local levels in order to eliminate the dependence on centralized systems as coal and nuclear. Commons like wind, water, sun should be free for a community and communities should rely on multiple cash flows to generate income. For example wind energy is available for all, it could be utilized without expensive large towers and without ruining the landscape as well [9]. For instance, the prayer flags which are traditionally being located on hilltops in case of Bhutan are now generating electricity by wind fluttering. This is a so called holy energy for Bhutanese who pray by setting flags in the wind. It could be an alternative for rural communities. Estimated if one million flag poles would generate electricity, it would result 360 MWs output [10].

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