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# Risk Management in Implementing Wind Energy Project

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**Abstract**

Analysis of possible risks in the process of implementing a specific project has been carried out, measures to reduce their negative impact on the project have been developed and proposed. The object of study is a wind energy project, namely a wind farm working as part of the national energy system. The implementation of the project is related to both external and internal risk factors that are characteristic to such projects in the real economy sector under the current conditions. Such risks have been classified and the fractional structure of risk adjustment has been analysed taking into account the properties of the particular wind energy project, which consists of three main components. A description has been given of the innovative technology selected for project implementation, power generation using wind, which is used to limit the negative influence of the above-mentioned risks. The current strategic management tools, such as SWOT analysis and McKinsey matrix, which are useful for the identification of project risks, have been examined. For the wind energy project that is being implemented, the project dot location coordinates were determined in the McKinsey matrix on axes: Advantages against competitors and Market attractiveness. Also, a sector characterising the project development prospects was established to be subsequently used as a tool for risk identification. Following the identification of risks, specific measures of state support and special project management measures were developed and proposed to be implemented with the aim of limiting the negative influence of the possible project risks.

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## 1. Introduction

The risk of the wind energy project (Konechenkov, 2012; Rolik, 2008), as well as the risk of any other project is some unspecified impact or condition that, in the case of occurrence, has an (positive or negative) impact on the project (or on one of the project objectives), thus on its cost, scope or quality. And the wind energy project risk management includes the processes associated with identifying, analysing and responding to project risks in order to increase the probability and degree of impact of positive risks and to reduce the possibility and impact of negative events within the project. In addition, it should be borne in mind that the closer the project is to its completion, the more reduced the possibility of the occurrence of risks is, as well as the possibility of influence on the course of the project and its results. The main purpose of the risk management cycle is preparation for the occurrence of risks, namely risk management planning**.** In order to have the opportunity to plan risk management, it is necessary to identify these risks. After that, it is possible to carry out qualitative and quantitative risk analysis. Once this stage of the cycle is passed, it is possible to plan response measures to risks and then the monitoring and control of risks.

Thus, the project risk management procedure lies in that fact that in the analysis process, involving the detection and assessment of risks, comparing their effectiveness, it is necessary to define a method of impact. Then, after making a decision to carry out an impact on the risk, it is necessary to carry out subsequent control of the impact results. All currently known methods of impact on risk are implemented in three ways: by way of reduction, retention or transfer (Yelistratov *et al.*, 2010). Among these methods, reduction is considered to be the most acceptable method. In turn, the most favourable result of reduction is the complete elimination of risk, i.e. prevention of it (Yelistratov *et al.*, 2013).

If such impact on risk is applied, efforts are made to implement the process as retention without additional funding. If this cannot be avoided, the provision is made for planning the use of funds accumulation, which is called self-insurance, or for the attraction of external financial resources in the form of various loans and grants.

Finally, a type of impact on risk such as transfer makes provisions for comprehensive project insurance. Under this approach, the reimbursement of all possible financial expenses, caused by the damage, is passed on to the insurance company (Rolik and Gornostay, 2015).

In the future the provision will be made for consideration of the impact on risk using the first method–reduction by analysing potential risks arising in the implementation of the specific project, and the development of measures aimed to reduce their negative impact on the project.

## 2. Object of research

### *2.1. Description of wind energy project*

The wind energy project, which is a wind park, operating within the state energy system, is considered to be the object of research. To begin implementation of this project, it will be necessary to obtain all of the necessary permits and approvals from local governmental institutions and organisations. It is proposed to construct the planned wind park on the basis of the SWT-3.2-113 DD (Siemens, 2013) wind power plants (WPP), manufactured by the SIEMENS Wind Power A/S German concern, the correct functionality of which has been proven for many years of operation in various regions of the world. By the beginning of the project, all of the WPPs shall be ready for delivery and shall be fully fitted with all of the equipment necessary for operation: blades, asynchronous generators, masts, control cabinets and gondolas.

The planned wind park will not occupy a large territory, and the WPPs will only produce clean electrical energy, thereby preventing the harmful greenhouse effect inherent in some other energy producers, which fully meets the requirements of the International Kyoto Protocol (United Nations, 1998). Under this project, during its life cycle each SWT-3.2-113 DD wind-driven power plant will produce 260,000 MWh of electrical energy, preventing the emission of 225,000 tonnes of CO2 into the atmosphere, which corresponds to the amount of $CO_2$ absorbed by a forest area of 8 sq. km over 20 years (Siemens, 2015).

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