

# Influence of Power Curves and Exchange based Energy Prices on the Value of Wind Parks

## Bachelorarbeit

zur Erlangung des akademischen Grades „Bachelor of Science (B.Sc.)“ im Studiengang  
Wirtschaftswissenschaft der Wirtschaftswissenschaftlichen Fakultät der Leibniz Universität  
Hannover

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Hannover, den 11. August 2014

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## 1. Introduction

In times of a growing awareness for environmental responsibility, the use of sustainable energy resources has become more important than ever before. Increasing prices of fossil fuels enhance this development. Since the beginning of the 1990ies, using wind power as a resource is promoted by the German government. It is aimed to reduce the amount of greenhouse gases by 40 % until 2020, compared to the year of 1990<sup>1</sup>. Therefore, the share of renewable energies on the total energy consumption is ought to be increased to at least 35 % until 2020. In order to achieve this goal, several arrangements have been taken like the support of wind energy production, especially. The major reasons for supporting wind energy are the high availability of the resource wind and the large space for offshore wind parks.

Nevertheless, besides its importance for the climate goals of the government, producing wind energy is just as subjected to financial aspects as other forms of electricity production. However, there are several aspects that are specific to wind energy and affect the economic consideration of this energy source. This paper is going to determine which factors should be considered in order to calculate the market value of wind energy and the project value of wind parks.

As the support of wind energy implicates also political influence factors on the value of wind energy, different options of governmental wind energy compensations are presented. In this context, the difference between governmental pricing and exchange-based pricing is explained. Furthermore, the effect of technology decisions on the value of wind parks is going to be specified. In a second step, the results of the research are considered in a case study. It is shown that the choice of the “right” pricing option, with consideration of exchange-based market prices and the used technology, has a significant influence on the expected returns of producing wind energy.

## 2. Research Background

At first, several publications that concentrate on the economic evaluation of wind energy and the financing of wind energy producing projects are presented. This step was necessary to identify the approaches that can be taken into account to analyze the research question of this paper.

The research of this paper is based on the cash-flow model that was developed in Koukal & Breitner (2013). They present a decision support tool that analyzes and evaluates the project

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<sup>1</sup> Bundesministerium für Wirtschaft und Technologie (BMWi) (2013, p. 7).

## 6. Conclusion and Outlook

This paper reveals some interesting results. As the case study of chapter 4 has illustrated, trading wind energy on the regular energy exchange market is not an alternative to the fixed EEG compensation. Governmental subsidies like the market premium model are necessary to promote the direct sale of wind energy at the power market. The EEG compensations of 15.4 ct/kWh or 19.4 ct/kWh, respectively, are simply too high compared to the market prices to enter the free energy exchange market. However, if wind energy is traded at the exchange market, it is more efficient to sell the produced energy in times of peak energy demand.

With the market premium model an alternative choice was presented that is able to generate higher returns than the fixed EEG compensation and therefore is very attractive to wind energy producers and investors in wind energy projects.

As explained in chapter 3, the case study illustrated that the technology choice can be an important factor in terms of increasing the profitability of wind projects. Thus, using more efficient wind turbines enhances the expected project value of wind parks.

Therefore, this paper deals with the major aspects of financing wind energy and provides several approaches to improve the profitability of wind plant, wind parks, or wind energy projects.

In order to create more statistically significant and therefore superior results, further research is needed. As the market compensation model is a relatively new approach, only a quite limited amount of research has been done so far<sup>47</sup>. It is desirable to collect long-term data of at least one year for a specific location. Such a data set should include wind speeds, the power output, the corresponding energy prices at the exchange market, and information about the used technology like power curves and investment costs.

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<sup>47</sup> Introduced with the EEG renewal in 2012.