

A Decision Support Tool for the Risk Management of Offshore Wind Energy Projects

André Koukal and Michael H. Breitner

Leibniz University Hannover, Institute of Computer Science for Business Administration,
Hannover, Germany
{koukal,breitner}@iwi.uni-hannover.de

Abstract. This paper provides a decision support tool (DST) to analyze and evaluate the project value of offshore wind energy projects within the framework of project finance. The DST is based on a discounted cash-flow model in combination with a Monte Carlo simulation (MCS) to measure project risks and manage these risks. To consider the special requirements of debt capital providers in this context, key figures like the debt service cover ratio (DSCR) are calculated. The DST is realized in Excel/VBA with the Excel Add-In Oracle Crystal Ball. An offshore wind park example in the German North Sea is simulated to validate the underlying simulation model and the DST.

Keywords: Decision support tool (DST), Monte Carlo simulation, offshore wind energy, risk management

1 Introduction

Offshore wind energy has been developed rapidly in the last twenty years. The technical aspects have been in the foreground for most of the time so that a continuous enlargement of wind turbines could be observed. In contrast to this development there has been no comparable expansion of the amount of constructed offshore wind energy plants. This is because the costs for such investments go up to two billion euros per wind park with a typical nominal power output of 400 MW [1]. Another reason is the large number of significant risk factors. Some are based on the low technical experience with these kind of plants. Others are inherent in this type of projects as the plants are difficult to access due to the great distance to the coastline. Thus also small failures can lead to long downtimes.

To further international efforts of climate protection the European Commission set their own goals regarding the reduction of greenhouse gas emissions which are widely known as the 20-20-20 targets. Furthermore, the current Renewables Directive defined that 20 % of the total EU energy consumption shall come from renewable energy sources [2]. To meet these goals the member states have set up National Renewable Energy Action Plans. In this context, different incentive systems and feed-in tariffs for supporting the extension of the installed offshore wind capacity have been