Financial Due Diligence of Offshore Wind Projects from Debt Capital Providers' View

Bachelorarbeit

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Contents

List of tables

List of figures

List of abbreviations

APV	adjusted present value
CAPM	capital asset pricing model
DCP	debt capital provider
DD	due diligence
DKB	Deutsche Kreditbank (German credit bank)
DSCR	debt service cover ratio
EEG	German Renewable Energies Act
EIB	European Investment Bank
EMEA	Europe, the Middle East and Africa
EPCI	engineering, procurement, construction and installation contractors
EU	European Union
EWEA	European Wind Energy Association
FCF	free cash flow
FDD	Financial due diligence
GB	gigabyte
GHz	gigahertz
GW	gigawatt
GWh	gigawatt-hours
IKB	Deutsche Industriebank AG
IRR	internal rate of return
KfW	Kreditanstalt fuer Wiederaufbau (German government-owned development bank)
kW	kilowatt
kWh	kilowatt-hours
LLCR	loan life cover ratio
MCS	Monte Carlo simulation
MW	megawatt
Nord/LB	Norddeutsche Landesbank (northern German state bank)
OCF	operating cash flow
OEM	original equipment manufacturers
OM	operation and maintenance
PLCR	project life cover ratio
PwC	PricewaterhouseCoopers
RAM	random access memory
ROI	return on investment
RQ	research question
SPV	special purpose vehicle
VaR	Value-at-Risk
WACC	weighted average cost of capital

1. Introduction

As of today, the German energy supply is the result of a mix of various sources. The share of renewable energies in this mix increases steadily. In 2014 e.g. it increased by 1.7% while fossil energy sources' contribution decreased to a total of 74.2% (Bundesverband der Deutschen Energie- und Wasserwirtschaft 2015). In 2015, renewable energies' share increased to a total of 30%. This highlights the positive developments taking place in the energy market right now.

The importance of cutting back on fossil energy sources in order to maintain a healthy earth for generations to come has reached the heart of many industrial countries. The pollution going hand in hand with fossil energy will affect the whole human race by means of e.g. climate change. This social and ecological reasoning is complemented by more pragmatic aspects such as the fact that fossil sources are finite.

The United Nations set a legally binding course of action in 2015 by declaring 2°C as the maximum threshold for global warming. One of the main pillars in achieving the goals of the 2015 Paris Climate Conferences will be renewable energies. The biggest share of renewable energies in terms of power production in Germany is occupied by wind energy. Especially offshore wind energy harbours vast potentials that need to be harnessed. Thanks to continuously advancing technologies, offshore wind becomes more and more attractive for many countries. Member states across the EU target a cumulative 40 GW of installed offshore wind capacity by 2020 (Arapogianni und Moccia 2013, 9). Due to the nature of offshore wind projects, reaching this goal goes hand in hand with enormous capital requirements.

Planned offshore wind parks in the German North Sea typically reach sizes of 400 MW and investment volumes between €1.6 billion - €2 billion (Winkelmann 2012). The crucial question arising from this is how and by whom these projects shall be financed. As a result of legal restrictions and Basel III, the answer to this question can't be found in large power producers' balance sheets anymore. However, off-balance sheet financing trough special purpose vehicles (SPVs) becomes more and more attractive. The number of debt capital providers, willing to lend to SPVs in the field of offshore wind continuously increases. Nonetheless, a financing gap exists and it needs to be addressed. Doing so requires governmental support through policy-driven-lenders like the European Investment Bank (EIB) as well as commercial lenders such as commercial banks, pension funds, insurance funds, etc. that are forced to look into so-called alternative assets due to the historically low interest rate level.

By providing debt capital to SPVs, the existing financing gap will narrow considerably. However, attracting these lenders through offshore wind parks is a complex, time-consuming and thorough process. This is owed to the fact that offshore wind projects are still highly fraught with risk compared to other investment opportunities in the sector of renewable energies such as onshore wind or even photovoltaic plants. The drastically different risk structures between these forms of renewable energies and offshore wind is evident by differences in debt-to-equity ratios. While ratios of 90:10 can be found on regular basis in the financing of onshore wind parks, offshore wind projects typically face equity shares between 30% and 40% (appendix 3). Reasons for this can e.g. be seen in higher risk profiles of offshore wind projects. Due to the fact that project finance ideally relies on future cash flows as the only source for repayments and debt capital providers don't have any recourse exceeding the equity brought into the project by sponsors, they will try to bargain for the equity share being as large as possible.

As a result, when it comes to making a financing decision, debt capital providers will want to know the project's ability to cover its' debt service from only the future cash flow generated. This information can be provided by a hand full of key figures, chief among them the *debt service cover ratio* (DSCR). The DSCR shows a prospect lender to what extend the cash flow can be seen as sufficiently high in order to cover the debt service for each period. In order to attract as much debt capital as possible, project developers will therefore want to know what exactly makes debt capital providers want to invest, what their requirements on the financial side of business are. This thesis aims to provide guidance by answering the following research question:

RQ: "What are the most essential components and requirements for debt capital providers when it comes to making an investment decision in the field of offshore wind and what is the outlook for future investments?"

In order to address this question, the first part of this thesis examines the current state of research and presents the research design at hand. Following this, the foundation for a thorough understanding of both, organisational and financial structures of offshore wind projects is laid out. Afterwards, several representative experts have been interviewed on the financial due diligence of offshore wind parks as well as the expected effects of upcoming EEG novelties. Falling back on the findings of the interviews, a case study is performed, simulating the process of a financial close with regards to debt capital providers requirements on a project's resilience. The case study will be performed using the financial decision support system *IRIAN-WE*. As a last step, the results of the thesis are discussed, recommendations for further research and limitations of this thesis are presented followed by a brief conclusion and outlook.

2. Research background

The following section represents the foundation of this thesis and is divided into the analysis of related work and the research design aiming to narrow the research gap.

and, as such, can increase lenders' situation. Liquidity reserves will typically be build up during the grace period in order to imporve a project's resilience which, in turn, reduces the project's IRR. The liquidity reservers can be used to cover the debt service in periods of highly fluctuating cash flows. The possibility to include such reserves in IRIAN-WE would result in significantly more realistic simulations of negotiations.

One of the most common practices when determining the DSCR is sculpting, which has been described above. Unfortunately, as of now, IRIAN-WE doesn't contain an option to fix the DSCR while adjusting other parameters. The possibility of fixing the DSCR would allow for significantly more realistic modellations of financial models as well as the process of achieving target DSCRs.

8. Conclusion and outlook

With regards to a healthier atmosphere for generations to come, reducing fossil energies to an absolute minimum is of the upmost importance. Possibilities for low-greenhouse gas power supply are numerous: photovoltaic, hydroelectricity, wind energy from both on- and offshore plants, etc. Technological capabilities have advanced to a point where risks in building renewable energy plants are increasingly predictable, leading to renewable energies becoming more and more attractive for investors and lenders.

Large scale deployment will most likely be realised trough project finance which requires technological maturity as well as a stable regulatory governmental environment. However, the learning curve in the field of offshore wind energy is still shaky. E.g. looking back with regards to monopile foundations, developers were convinced that these foundations could only be used in water depths of up to 30 meters and a maximum capacity of a 3 MW turbine. Today the industry knows that monopile structures can be used in depths of 40 meters with turbines of up to 7 MW installed. Another example in the are of offshore wind farm foundations are jacket structures that were used after tripods were deemed not good enough. However, these days jacket structures are going extinct because, again, monopiles are state of the art (Bartels, appendix 3). What this shows is that even with maturing technological understanding, offshore wind is far from being a "one size fits all"-industry. As a result, lenders will continue to demand high cover ratios and developments such as the loss of the acceleration model will contribute to the already existing difficulties in coping with the funding gap.

This thesis allows for a more in-depth insight into the procedures of debt capital providers with regards to the importance of financial key figures. A throughout understanding of risk profiles and their valuations will allow developers and lenders to work together more closely and realise an increasing number of offshore wind projects. Nonetheless, no matter how well structured a project is, the financing of offshore wind farms will still rely on the involvement of policy-driven lenders such as the EIB to stem massive shares of the debt capital provided.

Another important aspect for future success of offshore wind is the uncertainty about §24 EEG and its' impact on the electricity market. Further advancements will have to take place sooner than later in order for renewable energies to stay competitive as an alternative asset.