FINANCING OF AN OFFSHORE-WINDFARM

Risk Management

HSH NORDBANK AG
Dr. Jörg Böttcher

Kiel, 05.07.2017
1. Project Finance and Offshore-Projects

2. Assessment of Projects

3. Financial Assessment
Project Finance: All costs – inter alia operating expenses and debt service – are covered on the basis of the cashflow of the project alone.
## Project Finance

### Corporate Finance vs. Project Finance II

<table>
<thead>
<tr>
<th>Description</th>
<th>Corporate Finance</th>
<th>Project Finance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Debt service is covered by</td>
<td><strong>Cashflow of entire enterprise</strong></td>
<td>Debt service is provided by Projects’s cashflow only; Borrower is Special Purpose Company</td>
</tr>
<tr>
<td>Collateral</td>
<td>Usually part of enterprise’s assets are pledged</td>
<td>Project Cashflow is main economic collateral; however: all projects' rights and assets are pledged</td>
</tr>
<tr>
<td>Perspective</td>
<td>Balance-sheet-<strong>orientated</strong>, thus evaluation of the past performance</td>
<td>By <strong>Cashflow</strong> plan data, thus future related</td>
</tr>
<tr>
<td>Financing depends upon:</td>
<td>Creditworthiness of the enterprise</td>
<td>Reliability and predictability of the project’s cashflow</td>
</tr>
</tbody>
</table>
Installed offshore capacity:
Installed offshore capacity (Baltic Sea):
Agenda

1. Project finance and Offshore-Projects
2. Assessment of projects
3. Financial Assessment
Assessment of Projects

There are known knowns; there are things we know we know. We also know there are known unknowns; that is to say we know there are some things we do not know.

But there are also unknown unknowns – there are things we do not know we don’t know.

Donald Rumsfeld, US Secretary of Defense, February 2002
### Chance-Risk-Profil of a Project

#### Creation of a unity of interest

<table>
<thead>
<tr>
<th>Endogenous risks</th>
<th>Exogenous risks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Completion Risks</td>
<td>Resource Risks</td>
</tr>
<tr>
<td>e.g. completion</td>
<td>Country risk</td>
</tr>
<tr>
<td>guarantee</td>
<td>Market risk</td>
</tr>
<tr>
<td>e.g. Sponsors, who acts as operator</td>
<td>Assessment by banks’ engineer</td>
</tr>
<tr>
<td>Principle: Only proven Technology</td>
<td>use of Export Credit Agencies (ECAs)</td>
</tr>
</tbody>
</table>

#### Risk Allocation

- e.g. completion guarantee
- e.g. Sponsors, who acts as operator
- Principle: Only proven Technology
- Assessment by banks’ engineer
- use of Export Credit Agencies (ECAs)
- Take-or-Pay-Agreement

#### Requirements: Decrease of information asymmetries

- Early Information
- Tailor-Made Financial Structure (CF-Model)
- Simulation of the CF-Model (Rating Tool)

#### Remaining risks, which are not allocated to one of the parties

#### Key: Quantification of Project Risks

- Chance-Risk-Profil of a Project
- Early Information
- Tailor-Made Financial Structure (CF-Model)
- Simulation of the CF-Model (Rating Tool)
Assessment of Projects Completion and Operation

Risk Profil of Offshore-project (Bettina Ambacher, Offshore-Windenergie 2013, S. 619):

- Projektentwicklung: Genehmigung
- Bau: Abschluss Projektverträge / Bauentscheid
- Betrieb: IBN / Abnahme
- Risikoprofil
- Investitions Hochlauf
Assessment of Projects
.. Regulatory Regime..

Electricity Prices at EEX:
Seasonal Variation of average wind speed (Offshore-Windenergie 2013, S. 458):
Scour of Foundation (according to HAMIL, Bridge Hydraulics, 1999):
Assessment of Projects
Completion Risk – Wave Height

Wave Height at FINO 2011:

Signifikante Wellenhöhen

Quelle: Stohlmeyer 2013, S. 115.
Assessment of Projects
Experience Offshore (in relation to water depth and distance to shore) (Ralf Neulinger, Offshore-Windenergie 2013, p. 493):
Assessment of projects
View of an insurer

Risk Profile (Thomas Elleser, Offshore-Windenergie 2013, S. 522):

- Natural Perils
- Insurance Gap
- OFTO licensing agreement
- Environmental impairment
- Marine Collision Damage
- Late Delivery
- Weather Window
- Vessel availability
- O&M
- WTG Failure
- Design Defect
- Transportation
- Offshore Substation Failure
- Cable Damage
- EPC Performance

Risk Profile
Assessment of Projects
Some transactions – a Review


July 2017
Assessment of Projects
Offshore-transactions including the EIB

Finanzierungsvolumen: ca. EUR 3,5 Mrd.
Assessment of Projects
Overview

Summary

► Offshore Wind Energy projects highlight a core principle of project finance: Experience matters.

► Completion risk seems to be the most important risk regarding offshore wind energy projects. Offshore Windfarms in the Baltic Sea seems to be less risky in operation compared to projects located in the North Sea.

► Experience regarding wind yield seems to be quite good and sometimes above expectations.
Agenda

1. Project finance and Offshore-Projects
2. Assessment of projects
3. Financial Assessment
Financial Assessment
General Rules

1. Credit Lending of Project Finance is depending on predictable and stable cashflows.

2. Two main topics are on the agenda: the risk sharing among the parties and the cashflows stemming from the project contracts.

3. The Banks assess project quality on the basis of a base case scenario and with simulation calculations.

   1. The assumptions (data, timeline) should describe the most probable scenario of the project (probability of 50%, p(50)-level). The assumptions should be revealed in detail.

   2. The banks have to implement the project and its cashflows in their rating-tools on a p(50)-level. Downside scenarios are calculated automatically in their simulation calculation. The main driver of the simulation calculation are the A- and k-Parameter of the Weibull-distribution according to the wind assessment.

   3. Mere economic haircuts should not be implemented in the information package for the bank (or should be revealed as economic haircuts).
4. A downside scenario could be a drop in net energy yield by 25 % (basis – p(50)-value). The requirement would be that the project could cover debt service under this scenario.

5. A maximum debt volume can then provided to the project.

6. Knowing the maximum debt volume and the total investment costs, the sponsor knows how much equity has to be poured into the project.

7. In any case, a minimum equity contribution is required.
Financial Assessment
Core Figures

Traditional Approach

<table>
<thead>
<tr>
<th>Investor</th>
<th>Lender</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Internal Rate of Return</strong></td>
<td><strong>Debt Service Cover Ratio</strong></td>
</tr>
<tr>
<td><strong>Definition:</strong> Interest Rate, which leads to a Net Present Value of 0</td>
<td><strong>Cashflow + (Debt Service Reserve Account) Debt Service</strong></td>
</tr>
<tr>
<td><strong>Requirement</strong></td>
<td><strong>Initial requirement:</strong> Initially 1.25, usually slightly rising</td>
</tr>
<tr>
<td>Usually between 7 and 10 %</td>
<td></td>
</tr>
</tbody>
</table>
## Financial Assessment Case Study

<table>
<thead>
<tr>
<th>Project</th>
<th>„DOWNY O’DRAKE“</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Location</td>
<td>Germany, AWZ (North Sea)</td>
</tr>
<tr>
<td>Total Investment Cost</td>
<td>M€ 1.174</td>
</tr>
<tr>
<td>Term Loans</td>
<td>M€ 710</td>
</tr>
<tr>
<td>Equity</td>
<td>M€ 464</td>
</tr>
<tr>
<td>Finanzierungsstruktur</td>
<td>Annuity-style within 10,5 years</td>
</tr>
<tr>
<td>Grace Period (Tilgungsfreie Zeit)</td>
<td>18 months</td>
</tr>
<tr>
<td>Debt Service Reserve</td>
<td>not foreseen</td>
</tr>
<tr>
<td>Sum of opex p.a.</td>
<td>M€ 39,3 (initially)</td>
</tr>
<tr>
<td>Start of operation</td>
<td>01.07.2014</td>
</tr>
<tr>
<td>Name plate capacity</td>
<td>288 MW</td>
</tr>
<tr>
<td>Net Annual energy production</td>
<td>1.090 GWh (based on p(90)) kalkuliert)</td>
</tr>
</tbody>
</table>
**Financial Assessment**

**Interest Rate Change**

<table>
<thead>
<tr>
<th>Case</th>
<th>Min. DSCR</th>
<th>Ø DSCR</th>
<th>IRR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sponsors Case:</td>
<td>1.22</td>
<td>2.04</td>
<td>6.32%</td>
</tr>
<tr>
<td>2. Zinssatz plus 1 % p.a.:</td>
<td>1.32</td>
<td>1.90</td>
<td>4.87%</td>
</tr>
<tr>
<td>3. Zinssatz plus 3 % p.a.:</td>
<td>1.19</td>
<td>1.59</td>
<td>2.32%</td>
</tr>
<tr>
<td>4. Zinssatz plus 6,6 % p.a.:</td>
<td>1.00</td>
<td>1.42</td>
<td>-1.34%</td>
</tr>
</tbody>
</table>
### Financial Assessment

**Change of operating expenses**

#### Table:

<table>
<thead>
<tr>
<th></th>
<th>Min. DSCR</th>
<th>Ø DSCR</th>
<th>IRR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sponsors Case:</td>
<td>1,22</td>
<td>2,04</td>
<td>6,32 %</td>
</tr>
<tr>
<td>2. Operative Kosten plus 10 %:</td>
<td>1,14</td>
<td>1,99</td>
<td>3,65 %</td>
</tr>
<tr>
<td>3. Operative Kosten plus 20 %:</td>
<td>1,07</td>
<td>1,93</td>
<td>0,73 %</td>
</tr>
<tr>
<td>4. Operative Kosten plus 30 %:</td>
<td>1,00</td>
<td>1,88</td>
<td>-1,89 %</td>
</tr>
</tbody>
</table>

#### Graph:

- **1. Base Case:**
- **2. Operative Kosten plus 10 %:**
- **3. Operative Kosten plus 20 %:**
- **4. Operative Kosten plus 30 %:**
Financial Assessment
Decrease in Income

<table>
<thead>
<tr>
<th>Case Description</th>
<th>Min. DSCR</th>
<th>Ø DSCR</th>
<th>IRR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sponsors Case:</td>
<td>1.22</td>
<td>2.04</td>
<td>6.32 %</td>
</tr>
<tr>
<td>2. Einnahmen bei 95 %:</td>
<td>1.13</td>
<td>1.92</td>
<td>2.66 %</td>
</tr>
<tr>
<td>3. Einnahmen bei 87.3 %:</td>
<td>1.00</td>
<td>1.73</td>
<td>-4.65 %</td>
</tr>
<tr>
<td>4. Einnahmen bei 80 %:</td>
<td>0.87</td>
<td>1.56</td>
<td>-17.53 %</td>
</tr>
</tbody>
</table>

July 2017
A financial structure could be as follows:

- Pre-Financing of Debt service Reserve Account (Target Value: 50% of annual debt service)

- Grace period of 18 months

- Operating expenses fully flexible according to wind yield

- Straight line repayment over 8.5 years

- Increase of term loans by 80 M€ to 790 M€.
## Financial Assessment

### Negotiation Model II

<table>
<thead>
<tr>
<th>Case Description</th>
<th>Min. DSCR</th>
<th>Ø DSCR</th>
<th>IRR</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Sponsors Case</td>
<td>1.22</td>
<td>2.04</td>
<td>6.32%</td>
</tr>
<tr>
<td>2. Einnahmen bei 92 %:</td>
<td>1.08</td>
<td>1.85</td>
<td>0.17%</td>
</tr>
<tr>
<td>3. Kompromiss:</td>
<td>1.37</td>
<td>2.74</td>
<td>5.52%</td>
</tr>
<tr>
<td>4. wie 3, Einnahmen bei 92 %:</td>
<td>1.26</td>
<td>2.58</td>
<td>1.68%</td>
</tr>
</tbody>
</table>
Thank you for your kind attention.

HSH Nordbank AG
Structured Finance / 5661
Dr. Jörg Böttcher
Martensdamm 6
24103 Kiel
+49 431 900 12333
Joerg.boettcher@hsh-nordbank.com
joergboettcher@gmx.de