FINANCING OF AN OFFSHORE-WINDFARM

Risk Management

HSH NORDBANK AG
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Kiel, 05.07.2017

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Agenda

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1. **Project Finance and Offshore-Projects**
2. **Assessment of Projects**
3. **Financial Assessment**

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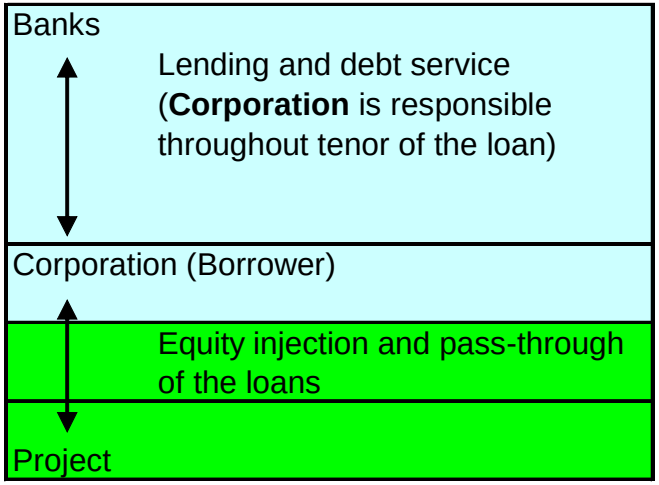
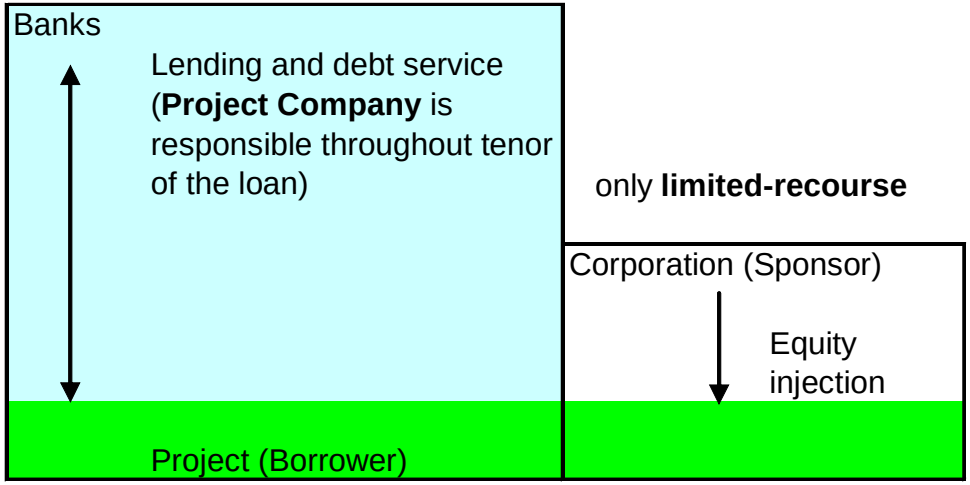
Project Finance: All costs – inter alia operating expenses and debt service – are covered on the basis of the cashflow of the project alone.

Corporate Finance



Project Financing



Project Finance
Corporate Finance vs. Project Finance II

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	Corporate Finance Finance	Project
Desription	**Debt service is covered by** Cashflow **of entire enterprise**	**Debt service is provided by** Projects‘s cashflow **only; Borrower is Special Purpose Company**
Collateral	**Usually part of enterprise‘s assets are pledged**	**Project Cashflow is main economic collateral; however: all** projects‘ rights and assets **are pledged**
Perspective	Balance-sheet**-orientated, thus** evaluation of the past performance	**By Cashflow** plan data, **thus** future related
Financing depends upon:	Creditworthiness of the enterprise	Reliability and predictability of the project‘s cashflow

Project Finance
Offshore Projects – Germany / North Sea

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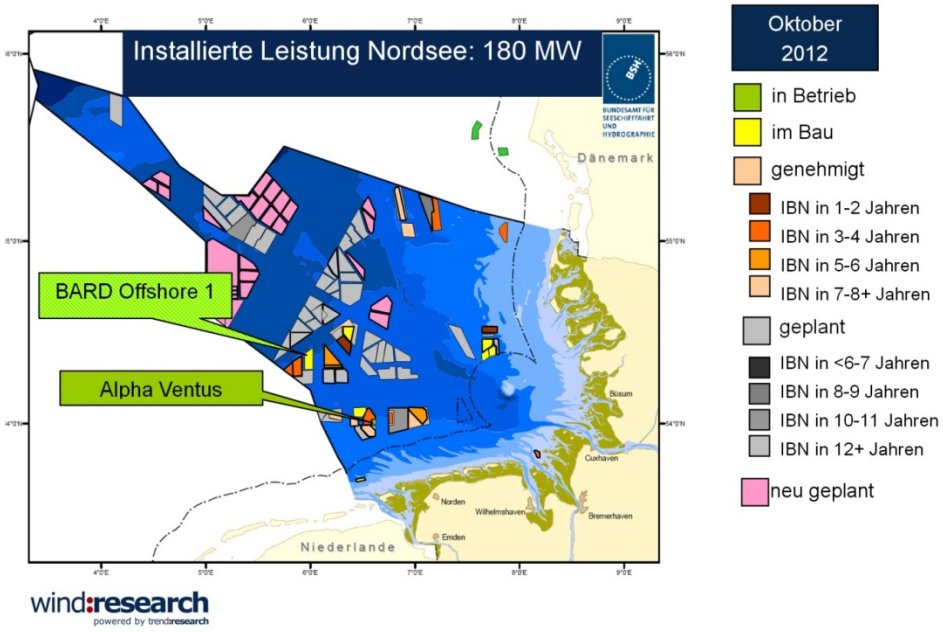
Installed offshore capacity:



Project Finance
Offshore Projects / Germany – Baltic Sea

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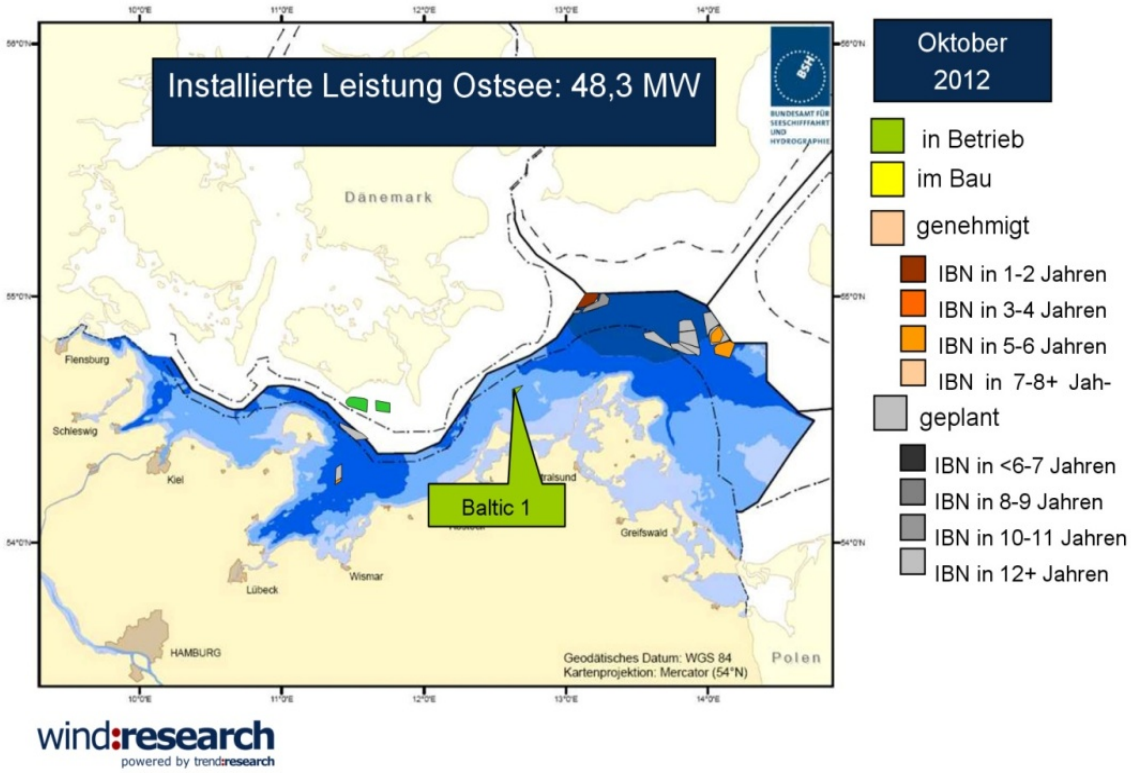
Installed offshore capacity (Baltic Sea):



Project Finance
Offshore Projects – Planned Investment (Germany)

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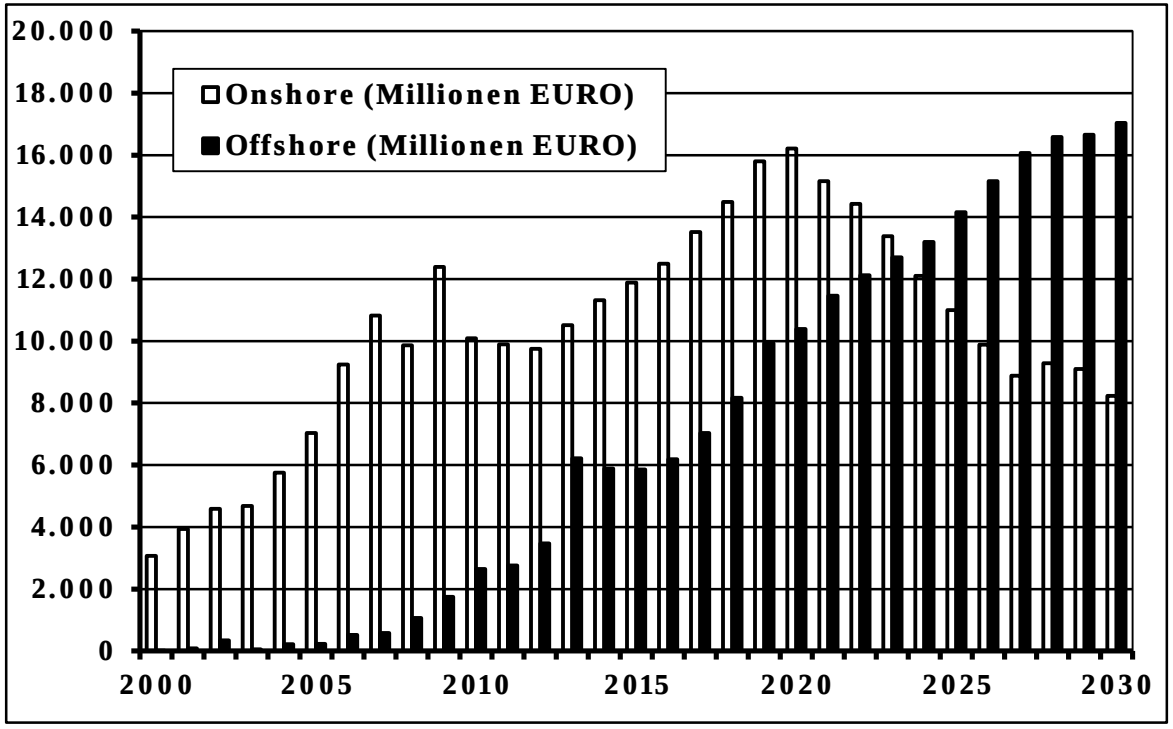
Planned Investment (in M€):



Quelle: Lothar Dannenberg, Offshore-Windenergie 2013, S. 338.

Agenda

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1. **Project finance and Offshore-Projects**
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Assessment of Projects

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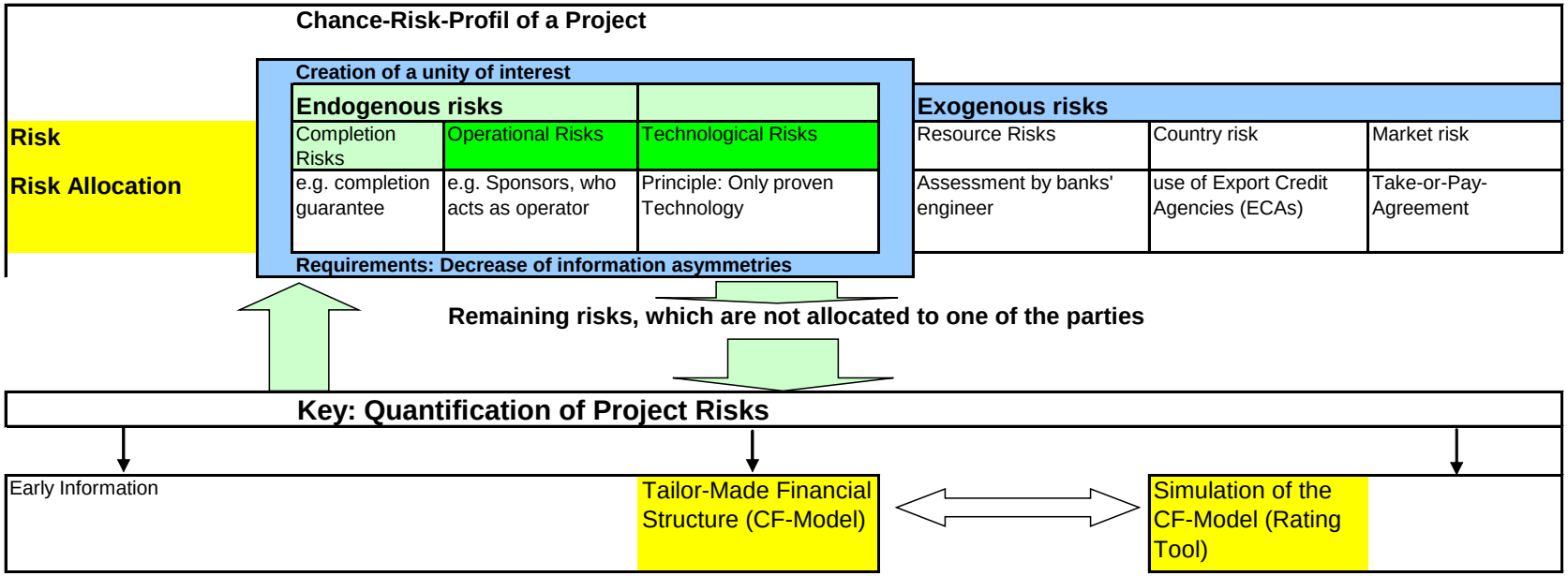
There are known knowns; there are things we know we know.
We also know there are known unknowns; that is to say we know there are some things we do not know.
But there are also unknown unknowns – there are things we do not know we don't know.

DONALD RUMSFELD, US SECRETARY OF DEFENSE, FEBRUARY 2002

Assessment of Projects
Risk Management



Assessment of Projects
Completion and Operation

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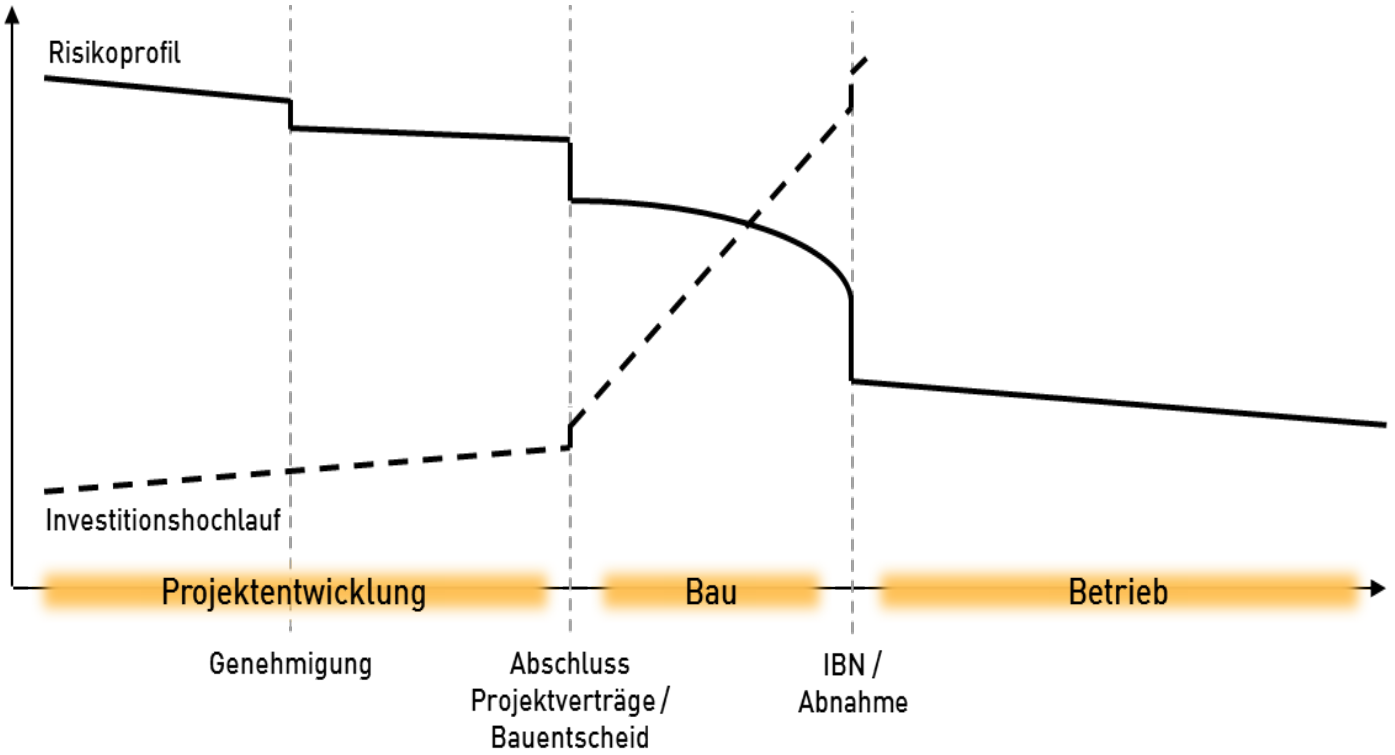
Risk Profil of Offshore-project (Bettina Ambacher, Offshore-Windenergie 2013, S. 619):



Assessment of Projects
.. Regulatory Regime..

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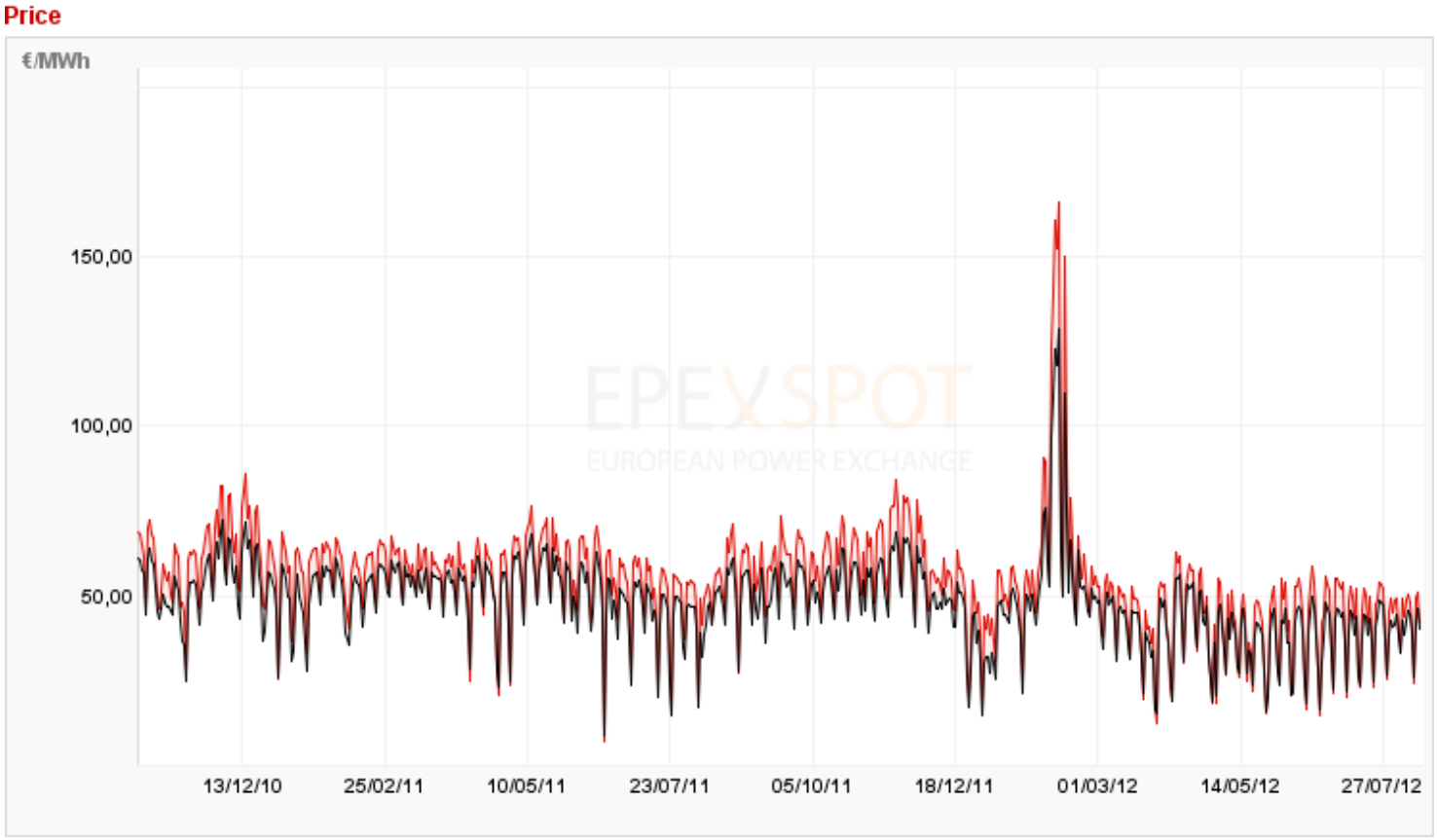
Electricity Prices at EEX:



Assessment of Projects
Variation of Wind speed

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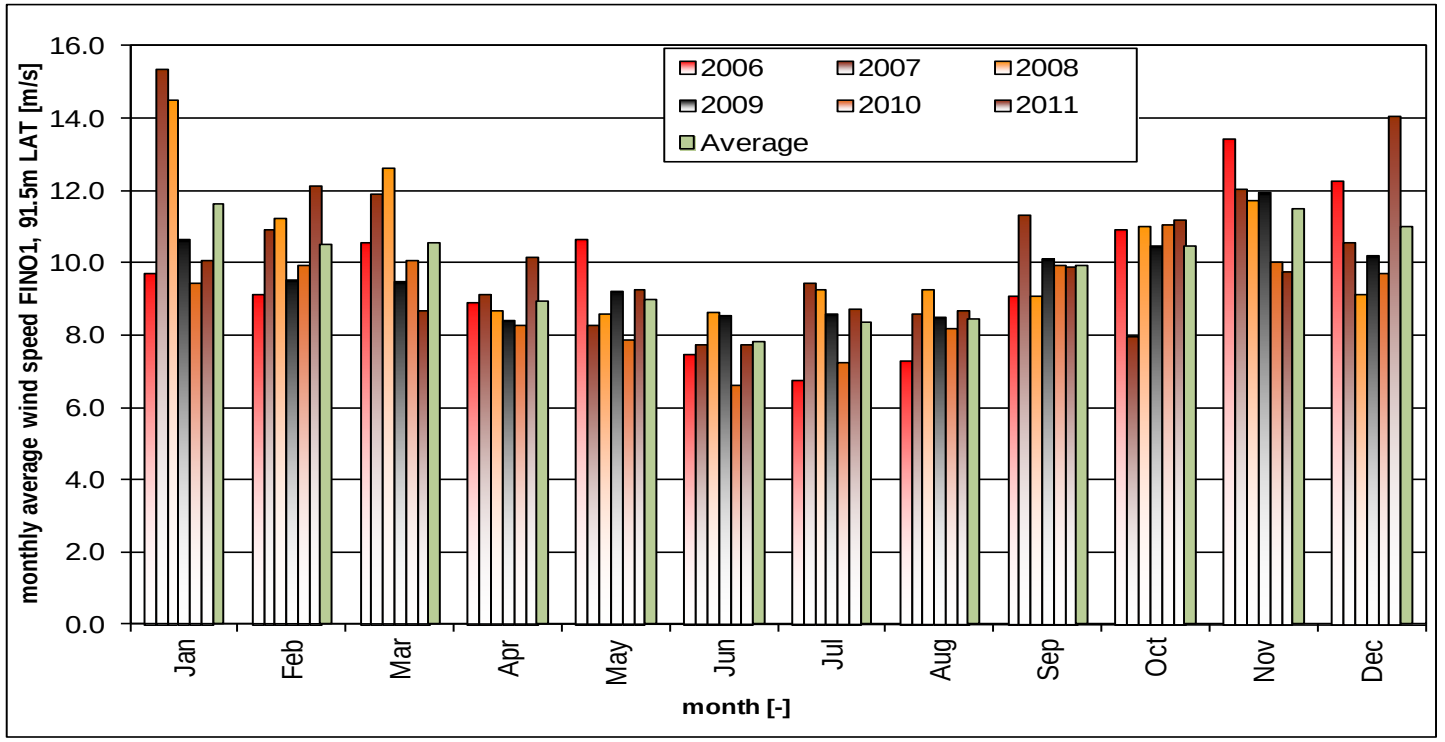
Seasonal Variation of average wind speed (Offshore-Windenergie 2013, S. 458):



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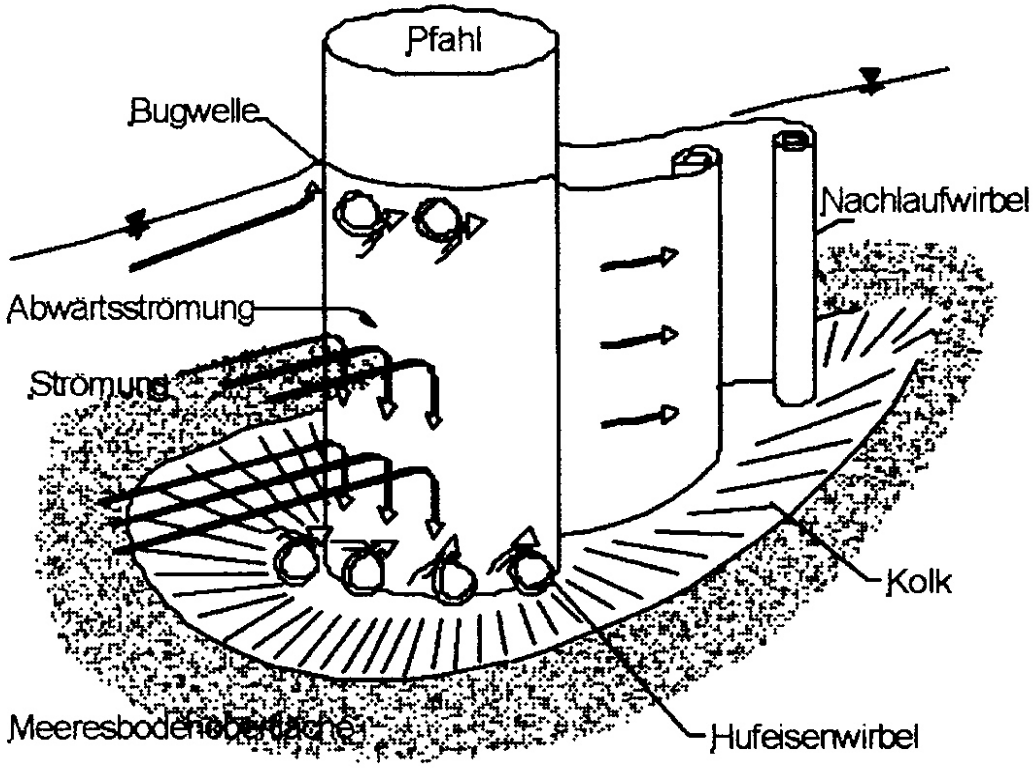
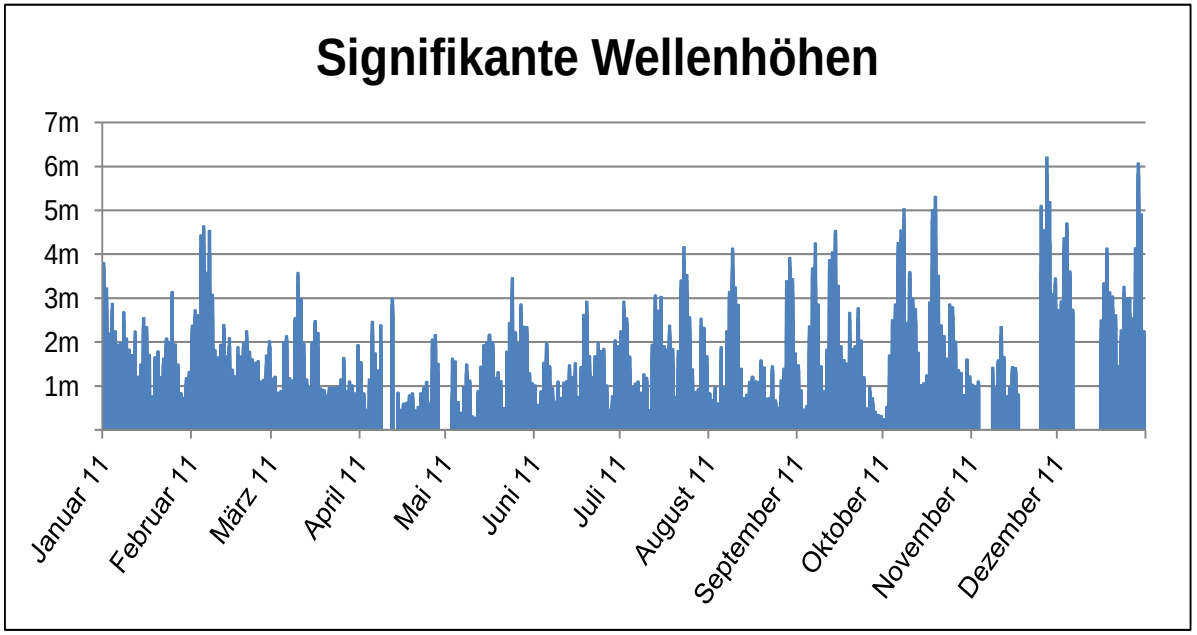
Scour of Foundation (according to HAMIL, Bridge Hydraulics, 1999):



Assessment of Projects
Completion Risk – Wave Height

Wave Height at FINO 2011:



Quelle: Stohlmeyer 2013, S. 115.

Assessment of Projects
Experience

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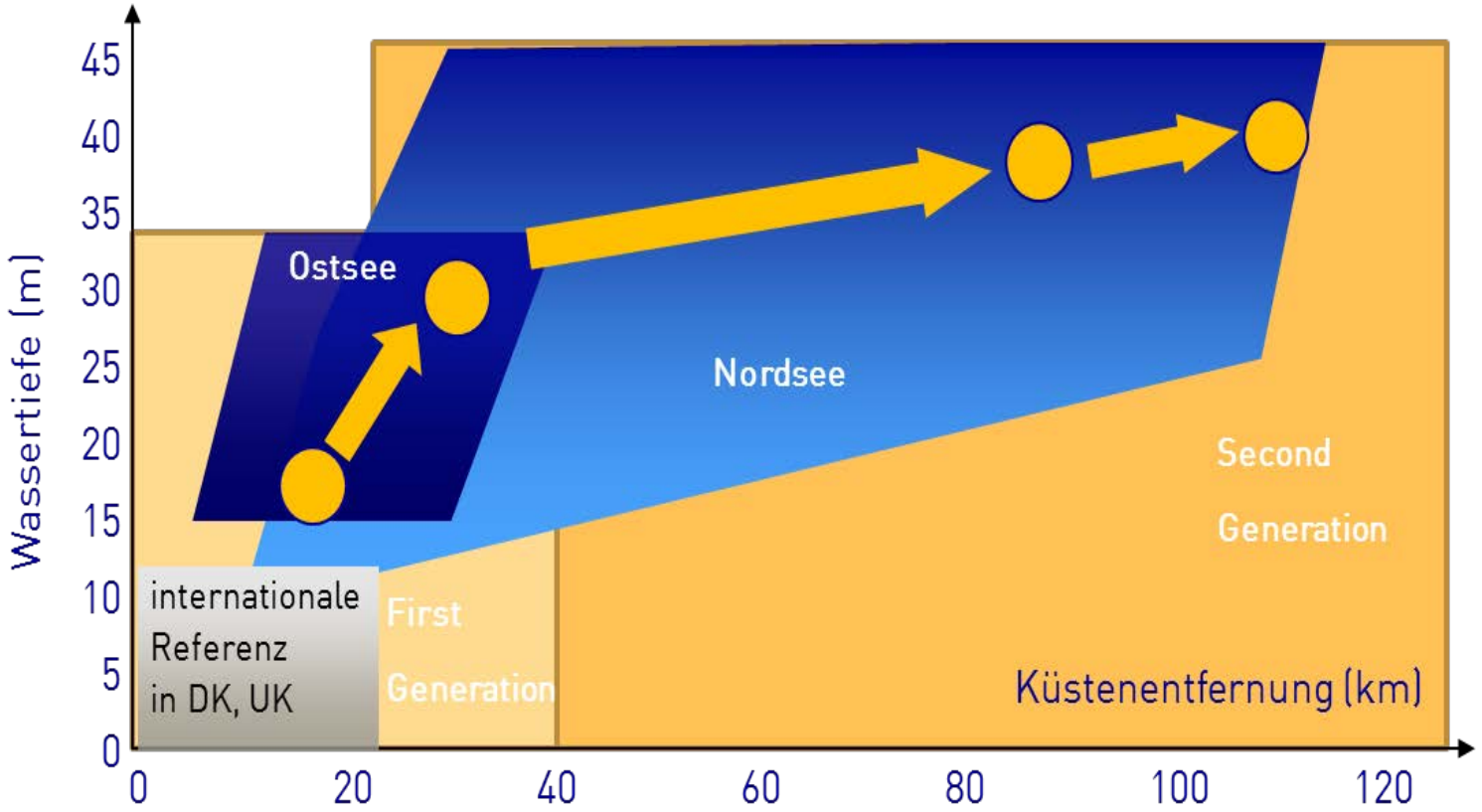
Experience Offshore (in relation to water depth and distance to shore) (Ralf Neulinger, Offshore-Windenergie 2013, p. 493):



Assessment of projects
View of an insurer

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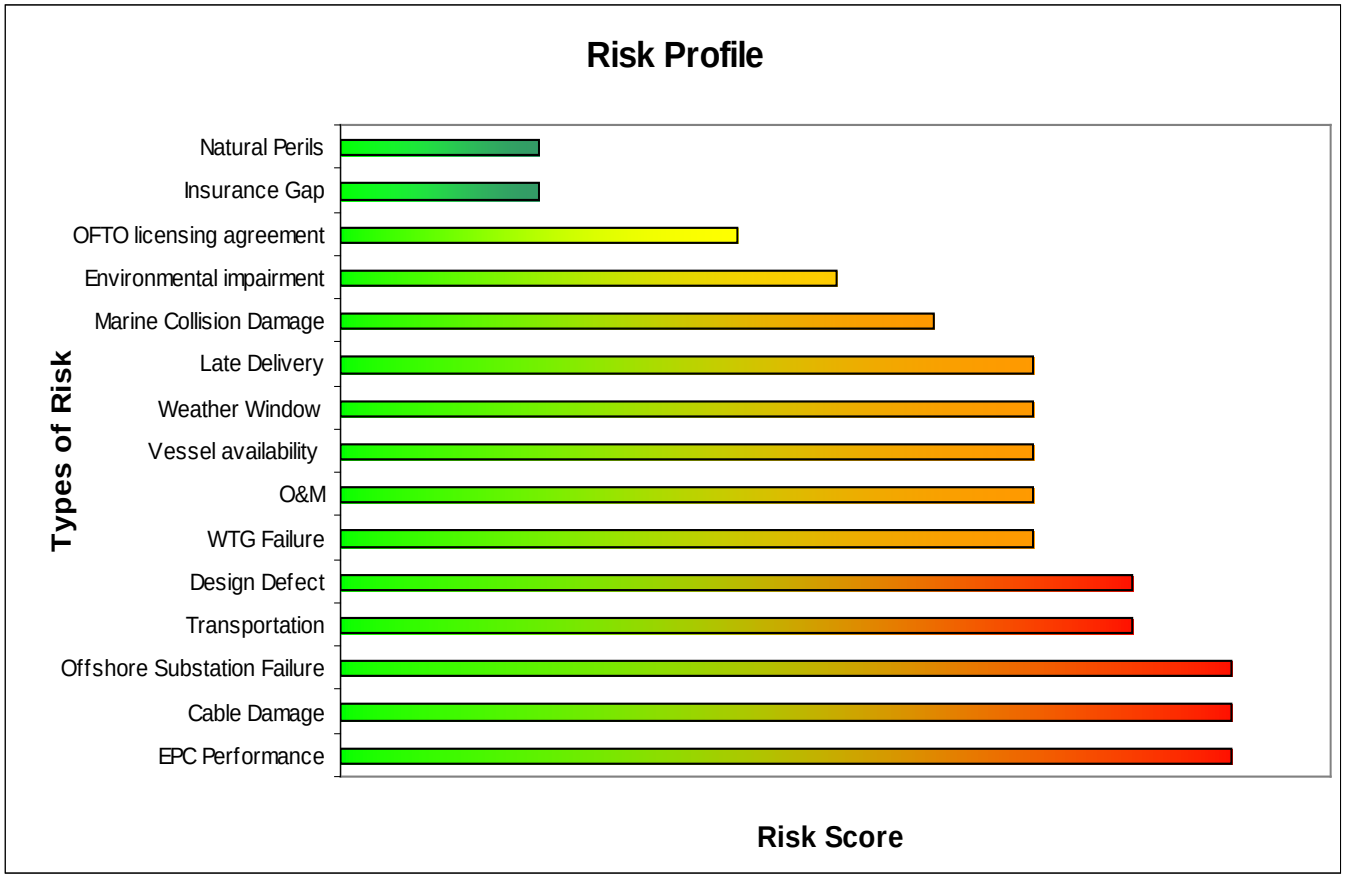
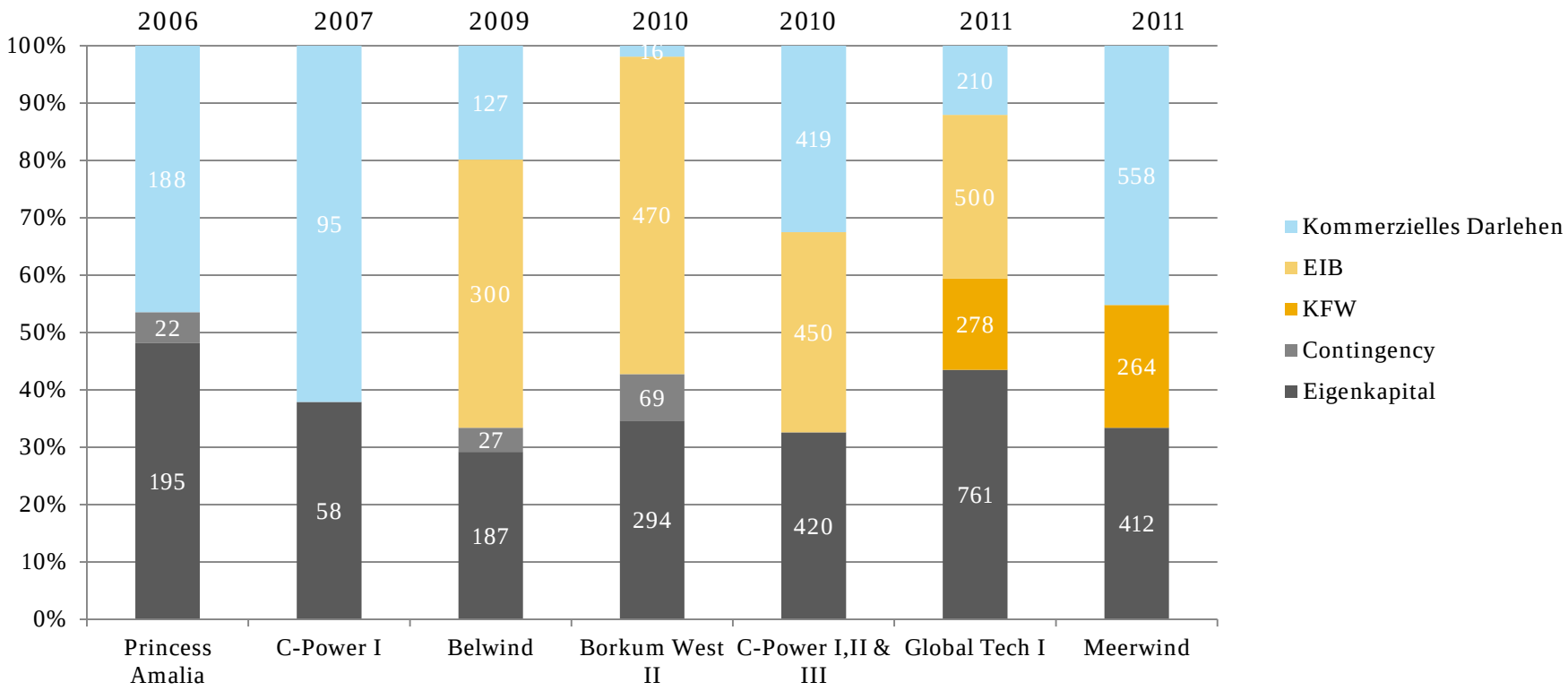
Risk Profile (Thomas Elleser, Offshore-Windenergie 2013, S. 522):



Assessment of Projects
Some transactions – a Review



Assessment of Projects
Offshore-transactions including the EIB

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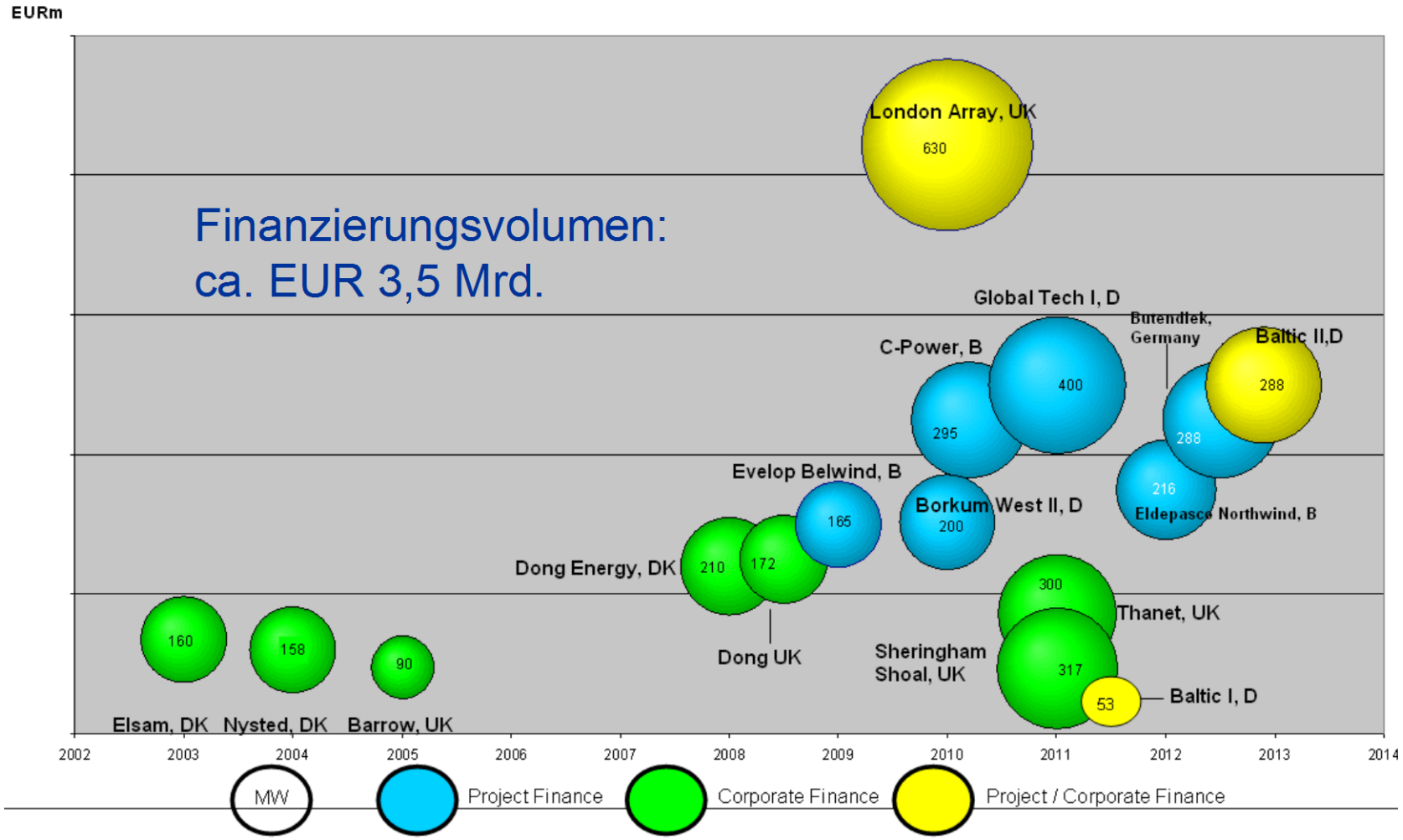

Assessment of Projects
Overview

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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

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1. **Project finance and Offshore-Projects**
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Financial Assessment
General Rules

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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).**

Financial Assessment
General Rules II

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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 sceanrio.
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

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	Traditional Approach	
	Investor	**Lender**
	Internal Rate of Return	Debt Service Cover Ratio
Definition:	Interest Rate, which leads to a Net Present Value of 0	Cashflow + (Debt Service Reserve Account) / Debt Service
Requirement	Usually between 7 and 10 %	Initially 1.25, usually slightly rising

Financial Assessment
Case Study

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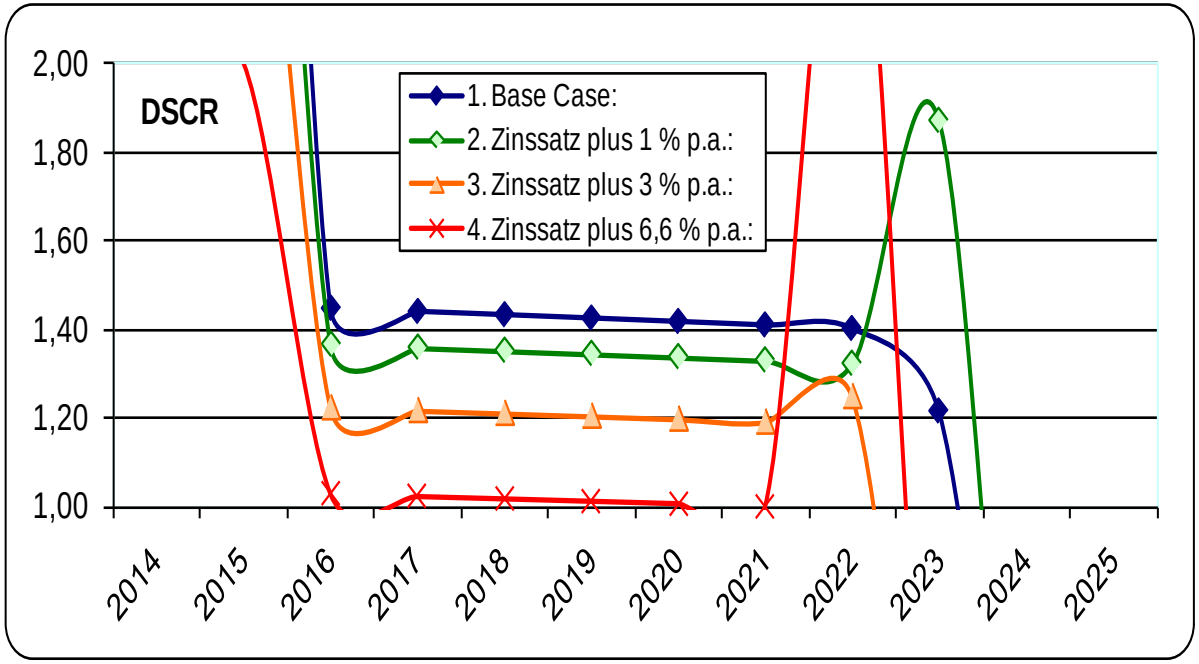
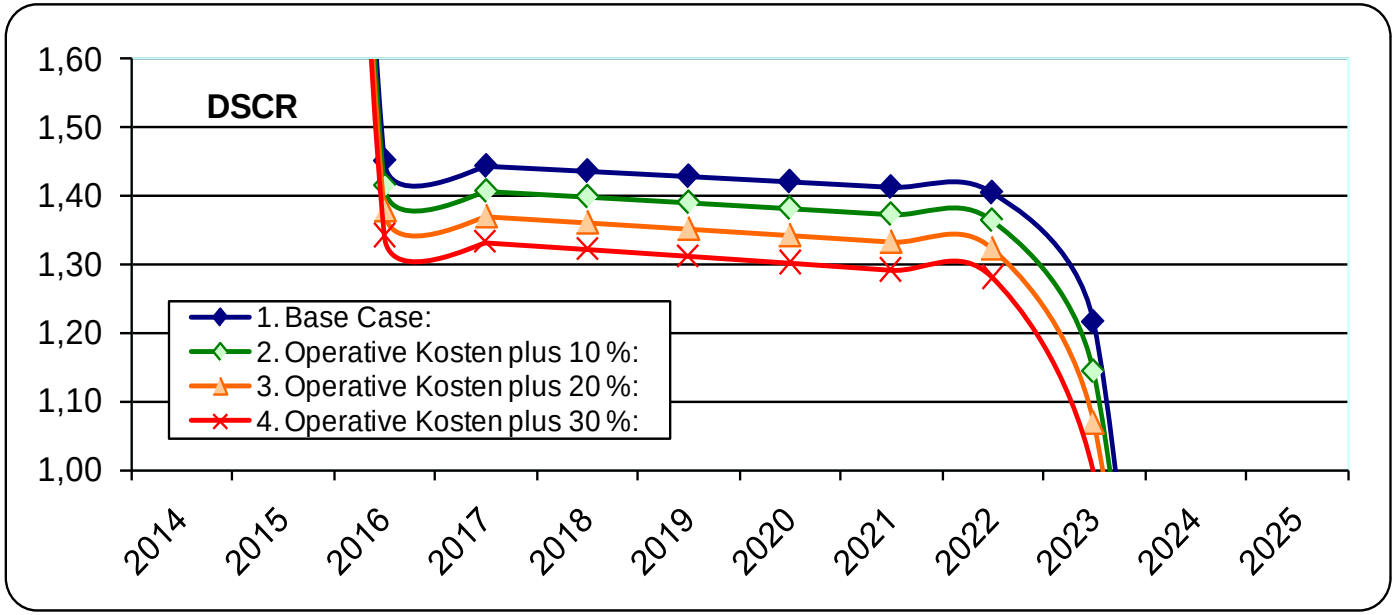
Project :	„DOWNY O'DRAKE“
Project Location :	Germany, AWZ (North Sea)
Total Investment Cost:	M€ 1.174
Term Loans :	M€ 710
Equity:	M€ 464
Finanzierungsstruktur:	Annuity-style within 10,5 years
Grace Period (Tilgungsfreie Zeit)	18 months
Debt Service Reserve :	not foreseen
Sum of opex p.a.:	M€ 39,3 (initially)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

Financial Assessment
Interest Rate Change



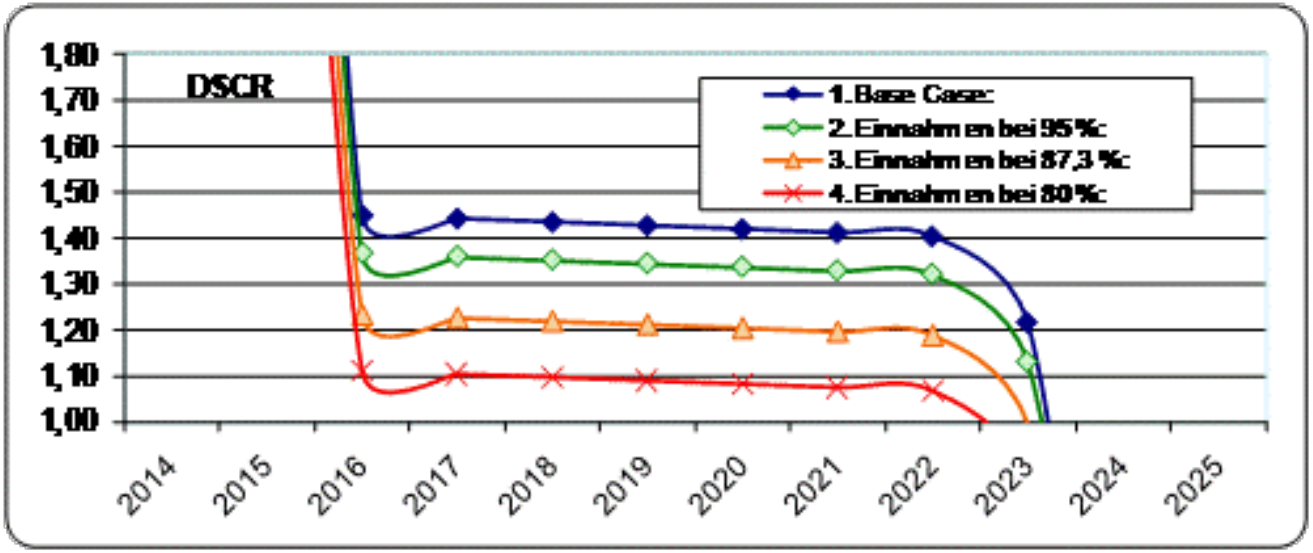
	Min. DSCR	Ø DSCR	IRR
1. Sponsors Case:	1,22	2,04	6,32 %
2. Zinssatz plus 1 % p.a.:	1,32	1,90	4,87 %
3. Zinssatz plus 3 % p.a.:	1,19	1,59	2,32 %
4. Zinssatz plus 6,6 % p.a.:	1,00	1,42	-1,34 %

Financial Assessment
Change of operating expenses



	Min. DSCR	Ø DSCR	IRR
1. Sponsors Case:	1,22	2,04	6,32 %
2. Operative Kosten plus 10 %:	1,14	1,99	3,65 %
3. Operative Kosten plus 20 %:	1,07	1,93	0,73 %
4. Operative Kosten plus 30 %:	1,00	1,88	-1,89 %

Financial Assessment
Decrease in Income



	Min. DSCR	Ø DSCR	IRR
1. Sponsors Case:	1,22	2,04	6,32 %
2. Einnahmen bei 95 %:	1,13	1,92	2,66 %
3. Einnahmen bei 87,3 %:	1,00	1,73	-4,65 %
4. Einnahmen bei 80 %:	0,87	1,56	-17,53 %

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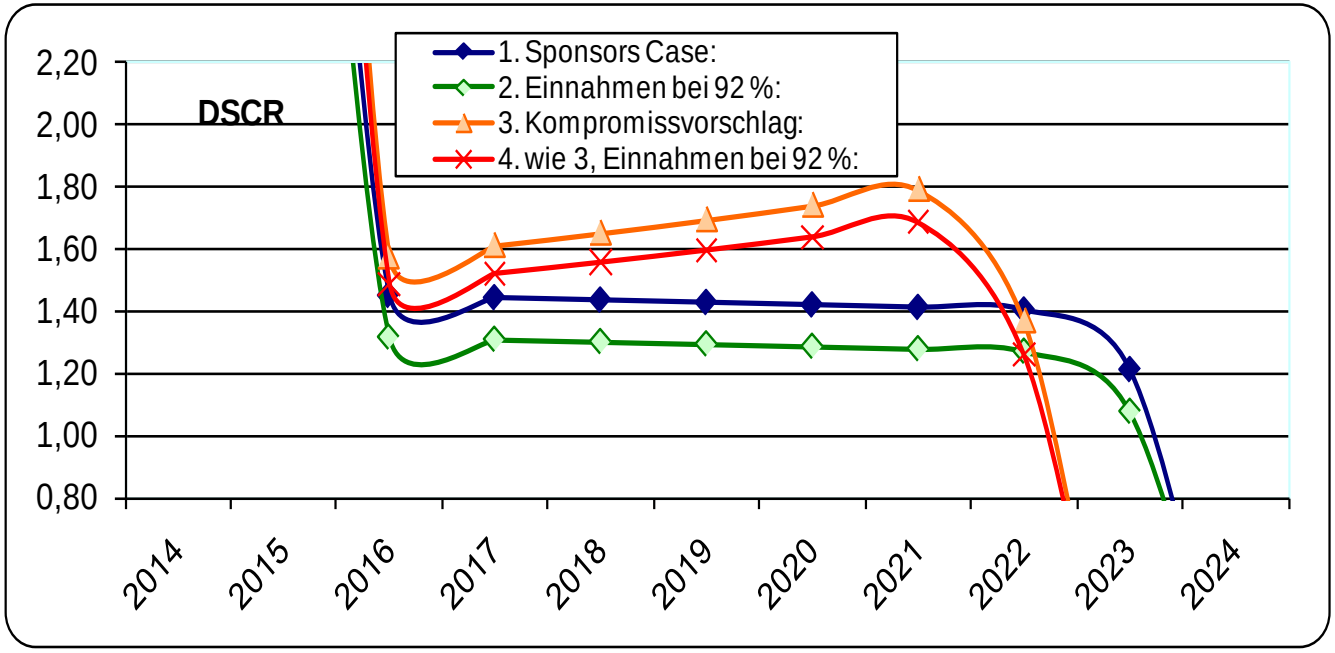
A financial structure could be as follows:

- 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



	Min. DSCR	Ø DSCR	IRR
1. Sponsors Case	1,22	2,04	6,32 %
2. Einnahmen bei 92 %:	1,08	1,85	0,17 %
3. Kompromiss:	1,37	2,74	5,52 %
4. wie 3, Einnahmen bei 92 %:	1,26	2,58	1,68 %

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Thank you for your kind attention.

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