

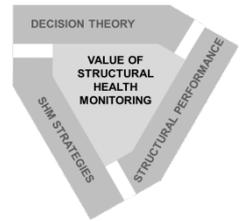
Fact Sheet on Wind Park Cost and Benefit Analyses

Factsheet WG1-7

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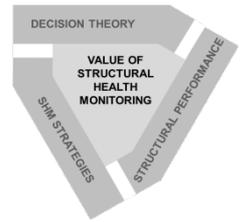
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Relation of cost and benefit analyses to Value of Information in SHM

Cost and benefit analyses are essential to Value of Information

- Economics of a structure are represented in simple models
- The model parameters are partly difficult to obtain e.g.
 - Interest rate
 - Future energy prices
 - ...
- Changes of the economic environment can be included
 - Subsidies
 - Market fluctuations
 - Sales
 - ...

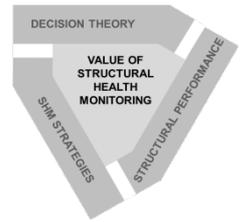


Cost and benefit model

Input figures are lending from offshore wind energy turbines

- Technical data may be acquired from studies and reports.
- Regulating financial frameworks, e.g. subsidies, can be found in laws or tender documents.
- Number strongly influenced by markets may be derived from exchanges and obligatory publications of companies.

CAPEX €/ kW	Interest rate %	Operation costs %	Capacity factor %	Availability %	Capacity kW	Spot market price €/ kw
4100.0	5.0	2.0	50.0	90.0	5000	0.0675
						0.039
						0.025



Cost and benefit model

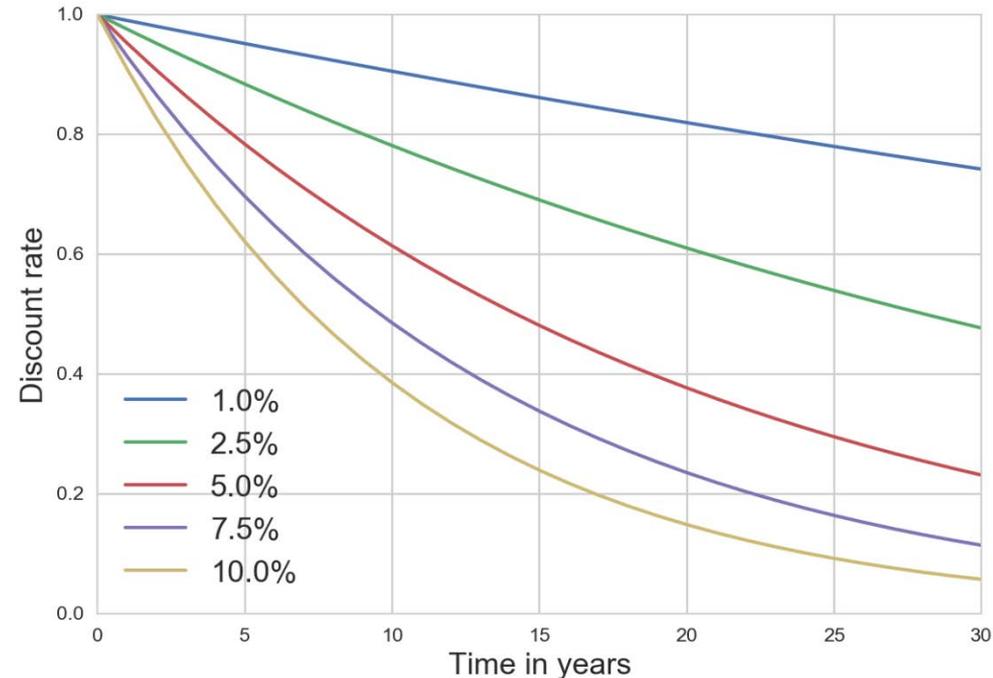
Discounting

With discounting the current value of futures values is calculated.

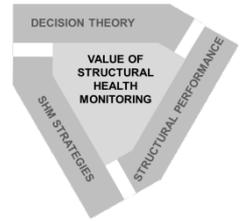
- Discount rate $r_d = (1 + i_{\%})^{-t}$
- Current value $CV = r_d \cdot FV$

Interest rate $i_{\%}$, time t , future value FV .

100 € a person receives in a year from now has a value of 95.24 € today assuming on the 95.24 € an interest of 5% was earned.

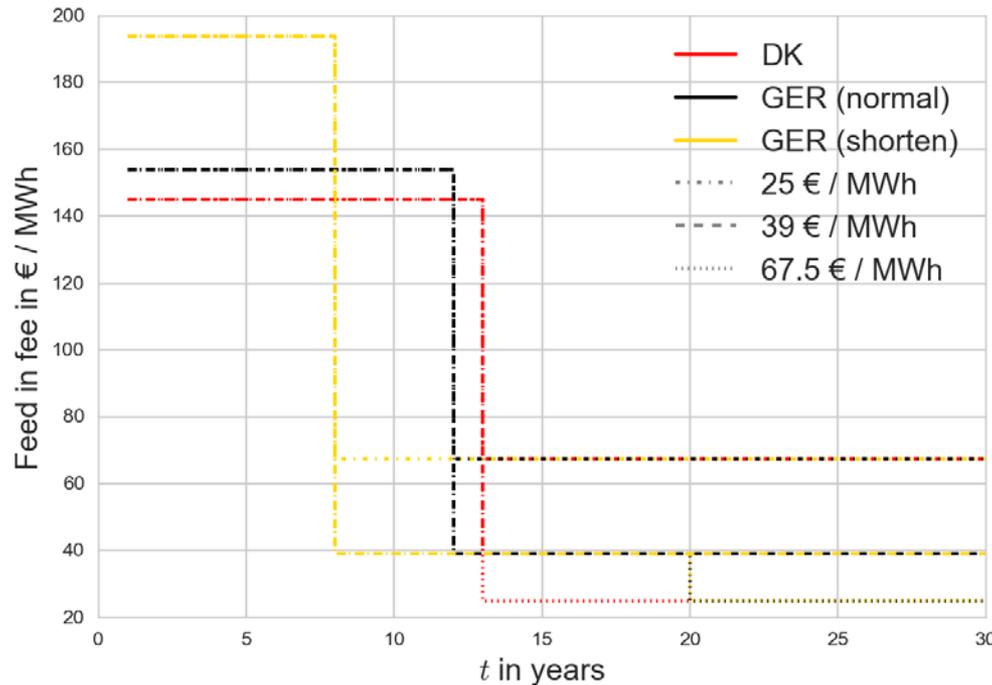


Exponential shrink of discount rate



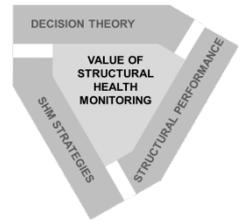
Examples

The fact sheet presents cost and benefits analyses for Denmark and Germany. More countries are adopting a support scheme similar to the Danish model.



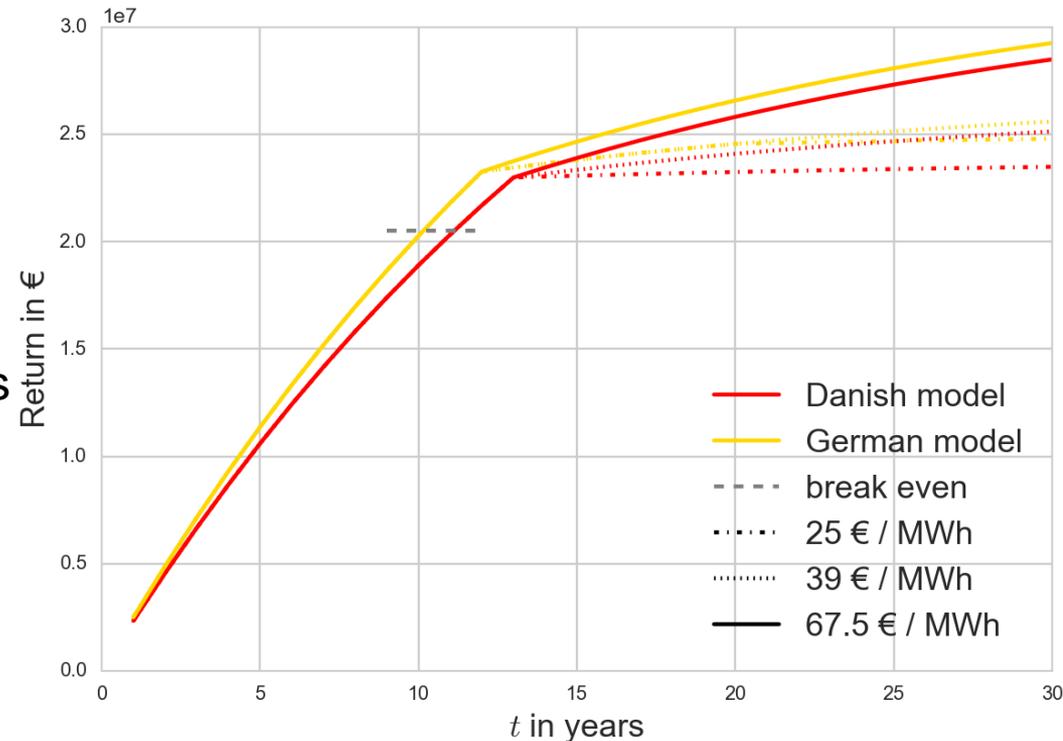
- Current German model guarantees feed in fees fixed by law
- Danish model guarantees the successful bidder the tendered electricity price.
- After the subsidy phase market prices apply.

Development of subsidies over time with varying feed in tariffs

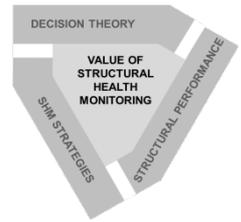


Examples

- The return develops quickly in the initial subsidy phase.
- After the subsidies phased out a slower growth due to market prices is expected.
- Return over Investment (RoI) is introduced as relative measure of success.

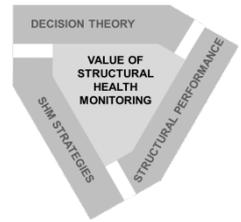


RoI	Denmark			Germany		
Tariff €/ MW	25.0	39.0	67.5	25.0	39.0	67.5
20 years	1.1341	1.1754	1.2595	1.1980	1.1980	1.2967
30 years	1.1458	1.2263	1.3902	1.2098	1.2490	1.4273



Interaction

- Ready to use for case study (WG4)
 - Several other European countries have a subsidy scheme in place like the Danish
 - Quickly adapted to case studies not related to offshore wind energy
- Tool provided (WG3)
 - Spreadsheet with examples will be made available on the [Action cloud drive](#)



Network support

- What are established ways to model the energy price development?
 - How to forecast the price for extended periods of time?
 - How to take important developments into account in the energy price model? E.g. OPEC actions, embargos, wars, etc.
- Is there a widely accepted way of determining the interest rate for discounting of investments?
- What is the ideal way to determine the interest rate for past / future energy prices?
 - Inflation rate?
 - Same rate as for investments?
 - ...

COST TU1402: Quantifying the Value of Structural Health Monitoring

