Baltic InteGrid
Integrated Baltic Offshore Wind Electricity Grid Development

From Cost to Benefit: The Added Value of a Meshed Offshore Grid.

Anna-Kathrin Wallasch

Espoo, 15 March 2018

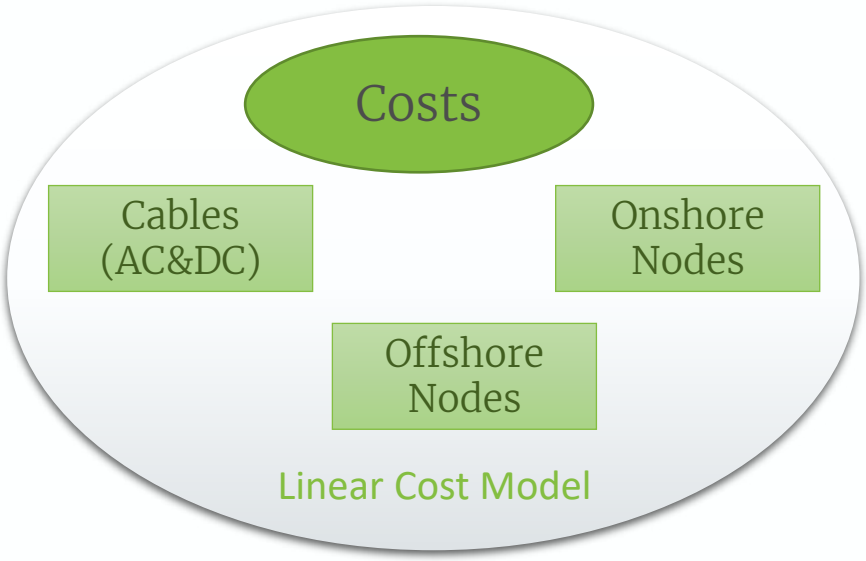
DEUTSCHE WINDGUARD

EU STRATEGY FOR THE BALTIC SEA REGION FLAGSHIP

Interreg Baltic Sea Region

EUROPEAN REGIONAL DEVELOPMENT FUND
EUROPEAN UNION

Costs – list of indicators



Approach

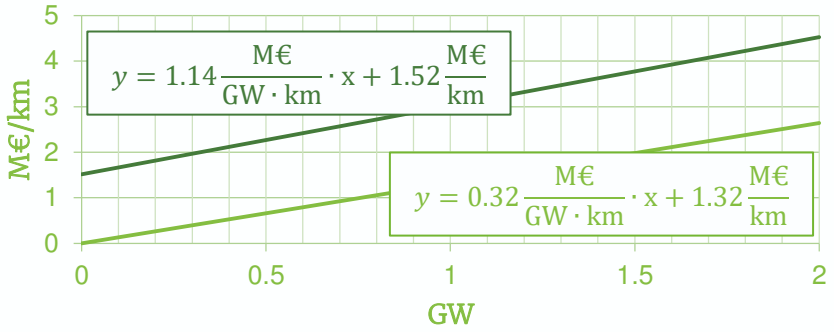
- Linear Cost Model (incl. expected future trends)
- Sensitivity Analysis
- All results dicsounted to 2017 with an interest rate of 4%

Evaluated as most suitable cost data sets

Linear Cost Model

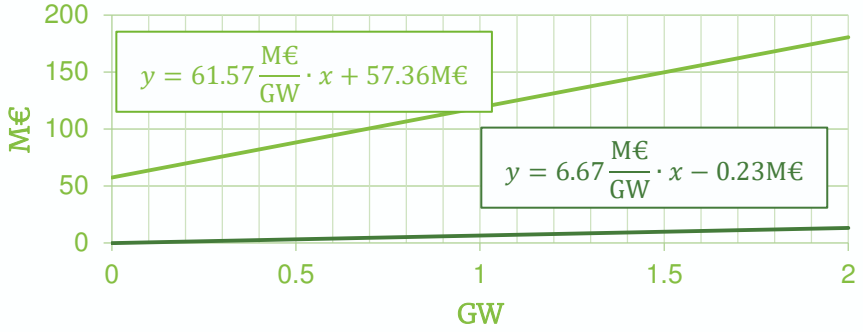
Cable Cost
(Cable + Installation)

- length- and power dependent cost
- length-dependent cost



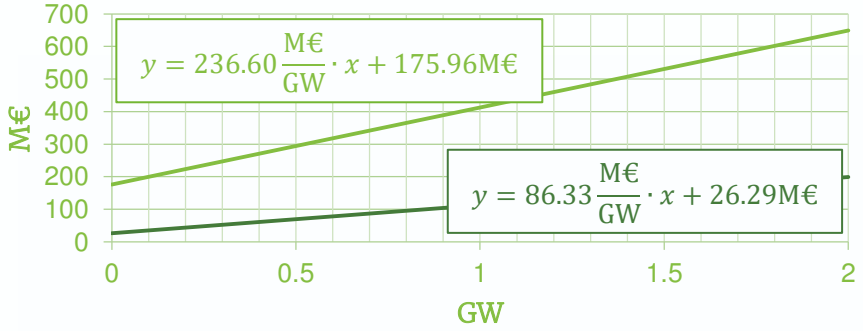
Onshore Node Cost
(Converter/Transformer + Installation)

- power-dependent cost
- fixed cost



Offshore Node Cost
(Converter/Transformer + Platform + Installation)

- power-dependent cost
- fixed cost

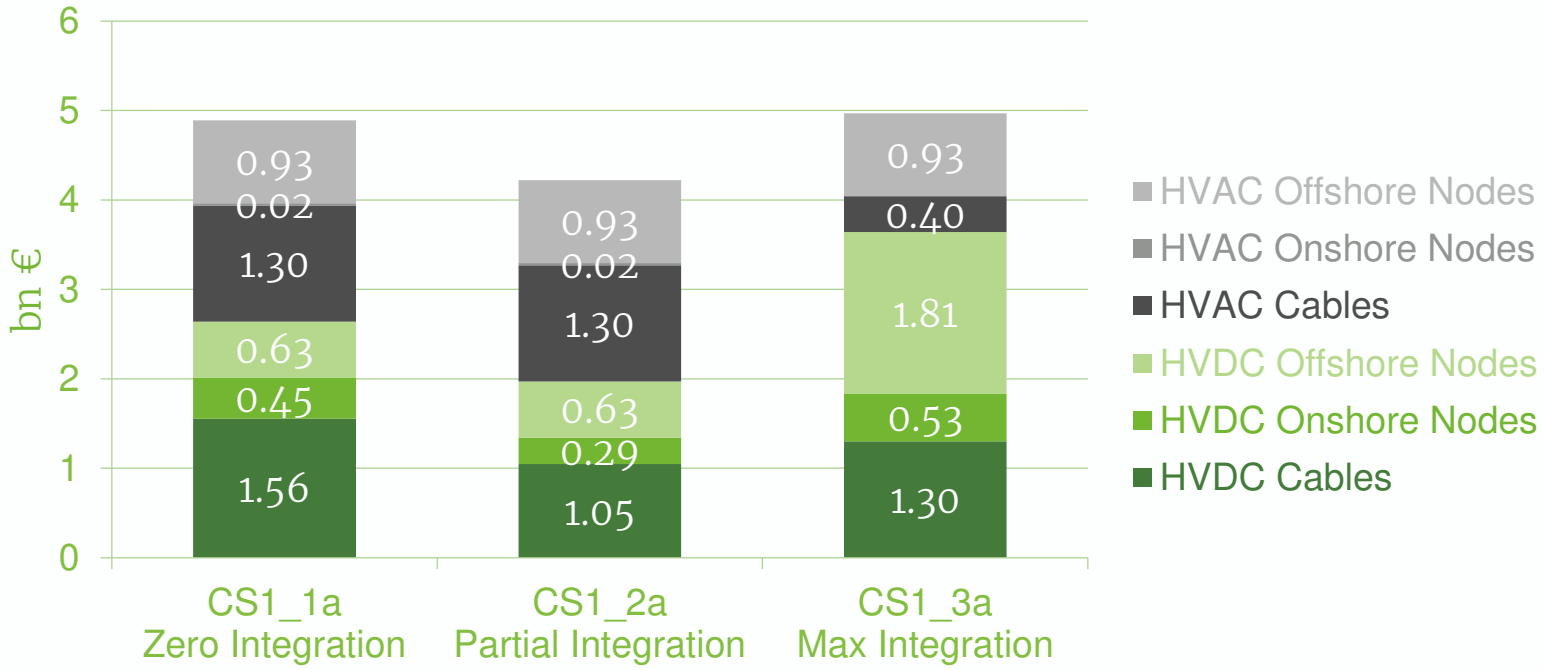


[Linear cost model, cf. Härtel et. al. 2017]

HVDC HVAC

CS1 (SE/PO/LT)

High Offshore Wind power

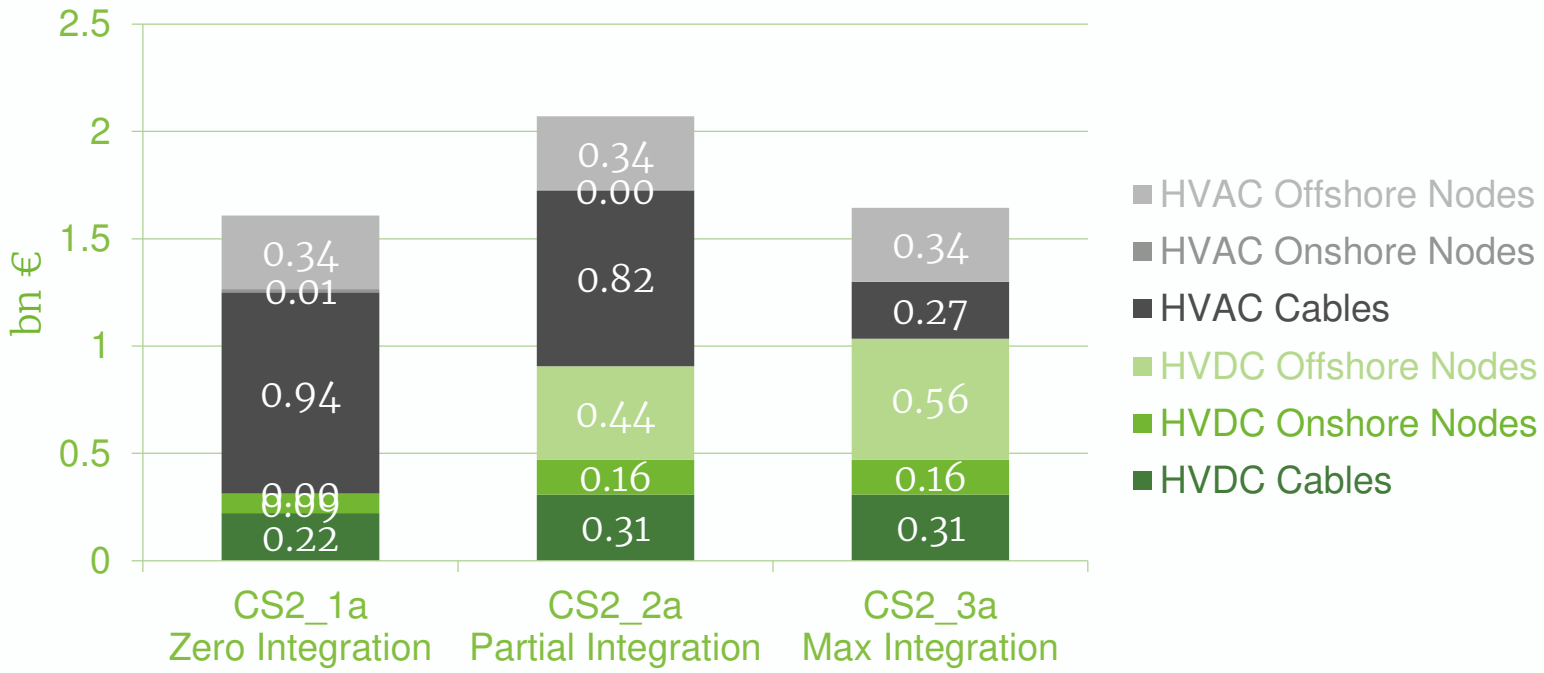


CS1 (SE/PO/LT)

Low Offshore Wind Power

CS2 (DE/SE/DK)

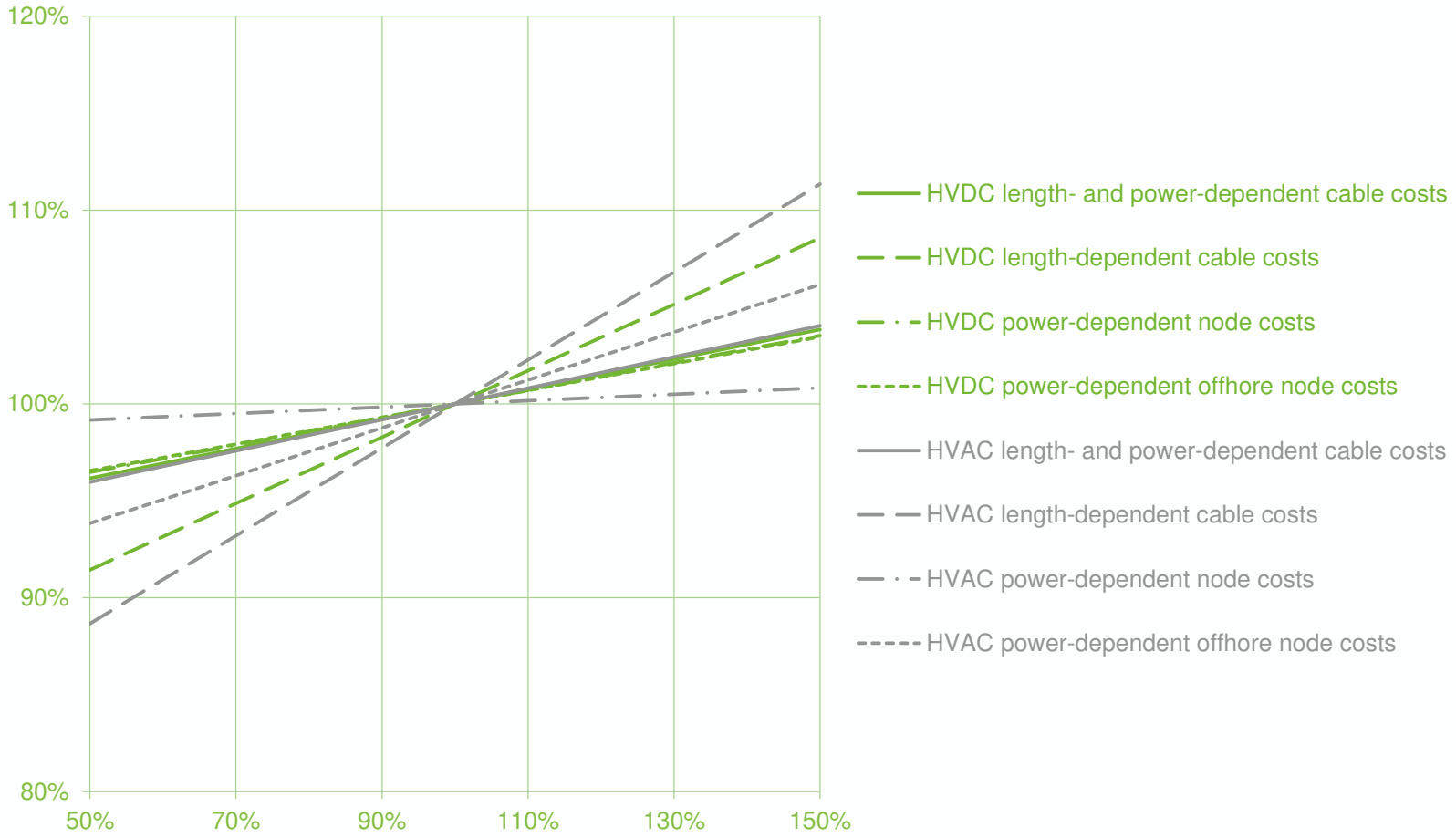
High Offshore Wind Power



CS2 (DE/SE/DK)

Low Offshore Wind Power

Sensitivity Analysis



Exemplary Analysis for CS1_2a (Part. Integ., High OWP)

Net Present Benefit

CS1 (LT/PO/ SE)

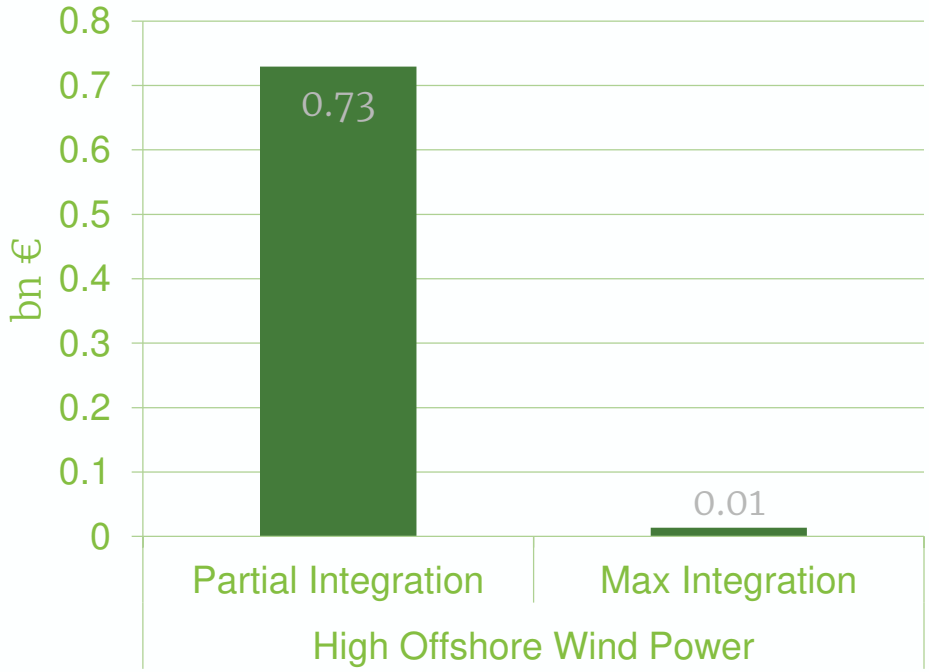
CS1 (LT/ PO/SE)			
High Offshore Wind Power		Low Offshore Wind Power	
Partial Integration	Max Integration	Partial Integration	Max Integration
CS1_2a - CS1_1a	CS1_3a - CS1_1a	CS1_2b - CS1_1b	CS1_3b - CS1_1b
Benefit Difference (higher is better)			
0.06 bn€	0.09 bn€	0.92 bn€	0.99 bn€
Cost Difference (lower is better)			
-0.67 bn€	0.08 bn€	0.17 bn€	-0.03 bn€

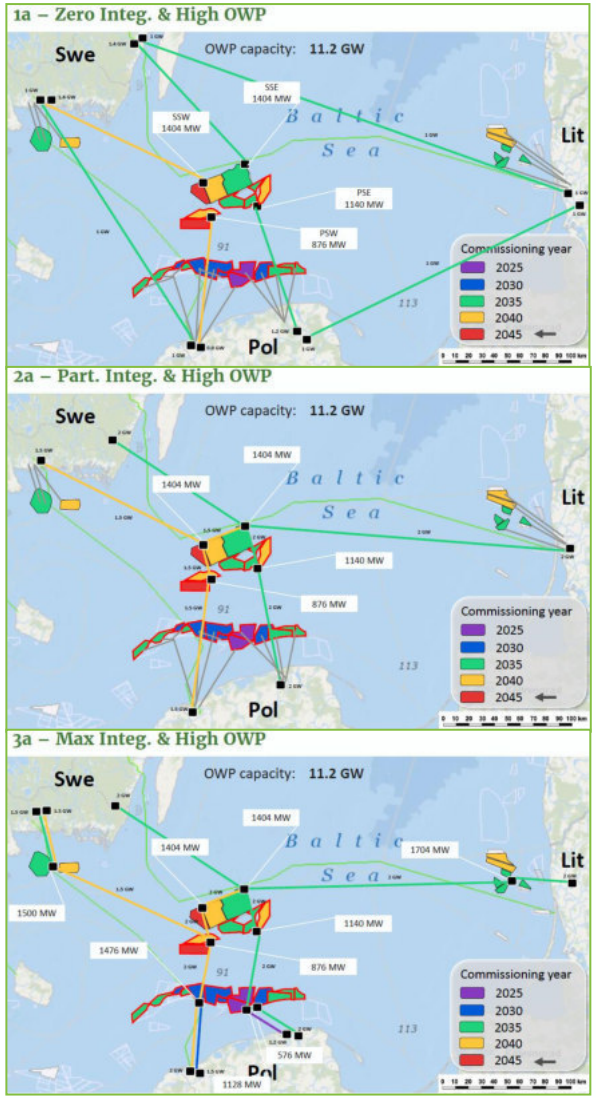
CS2 (DE/SE/DK)

CS2 (DE/SE/DK)			
High Offshore Wind Power		Low Offshore Wind Power	
Partial Integration	Max Integration	Partial Integration	Max Integration
CS2_2a - CS2_1a	CS2_3a - CS2_1a	CS2_2b - CS2_1b	CS2_3b - CS2_1b
Benefit Difference (higher is better)			
1.83 bn€	1.76 bn€	-0.03 bn€	-0.01 bn€
Cost Difference (lower is better)			
0.46 bn€	0.04 bn€	-0.02 bn€	0.12 bn€

CS1 (SE/PO/LT)

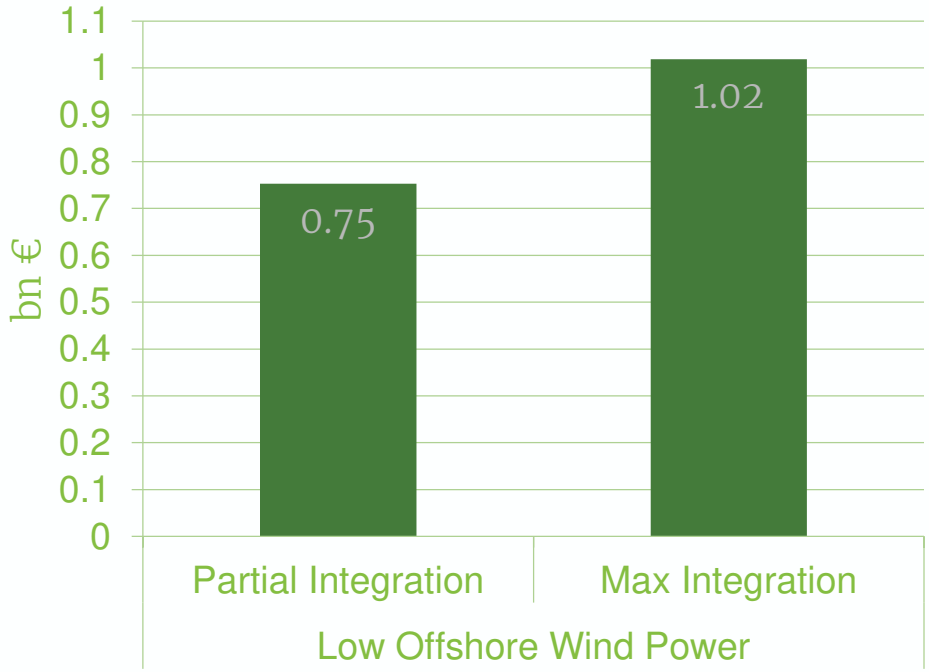
High Offshore Wind Power

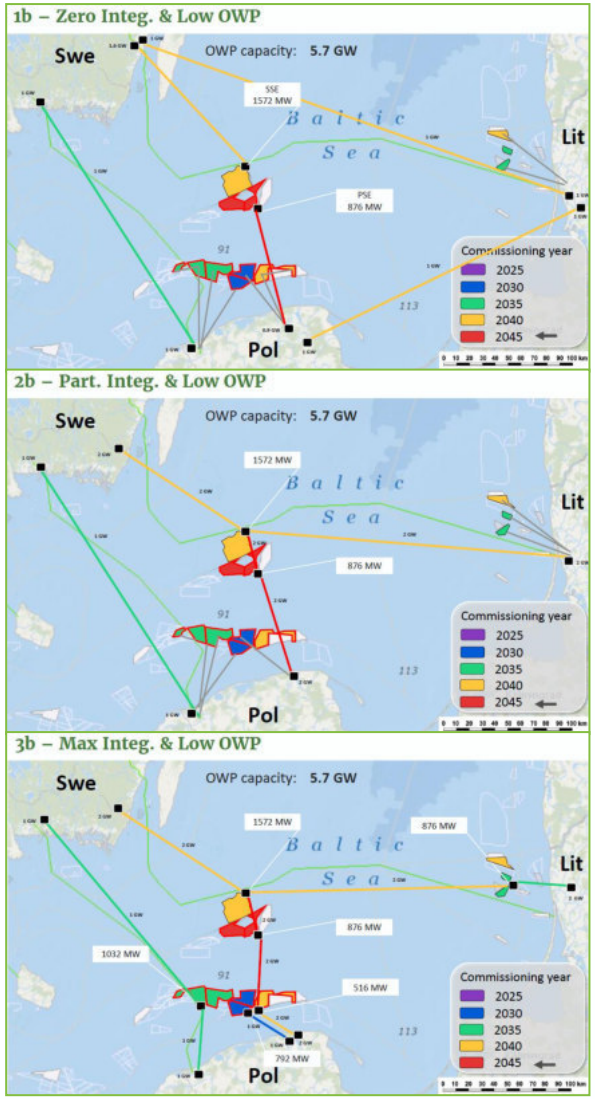




CS1 (SE/PO/LT)

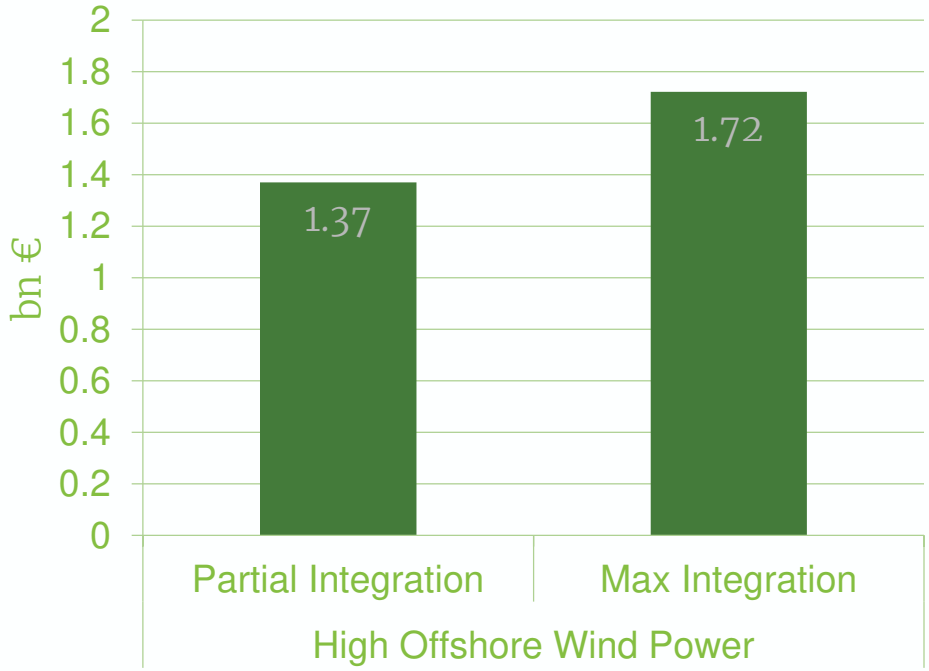
Low Offshore Wind Power

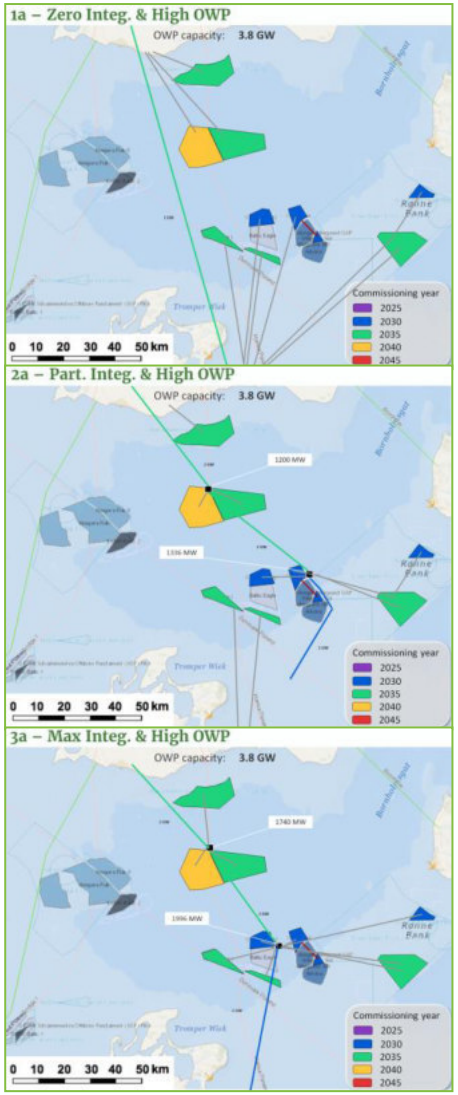




CS2 (DE/SE/DK)

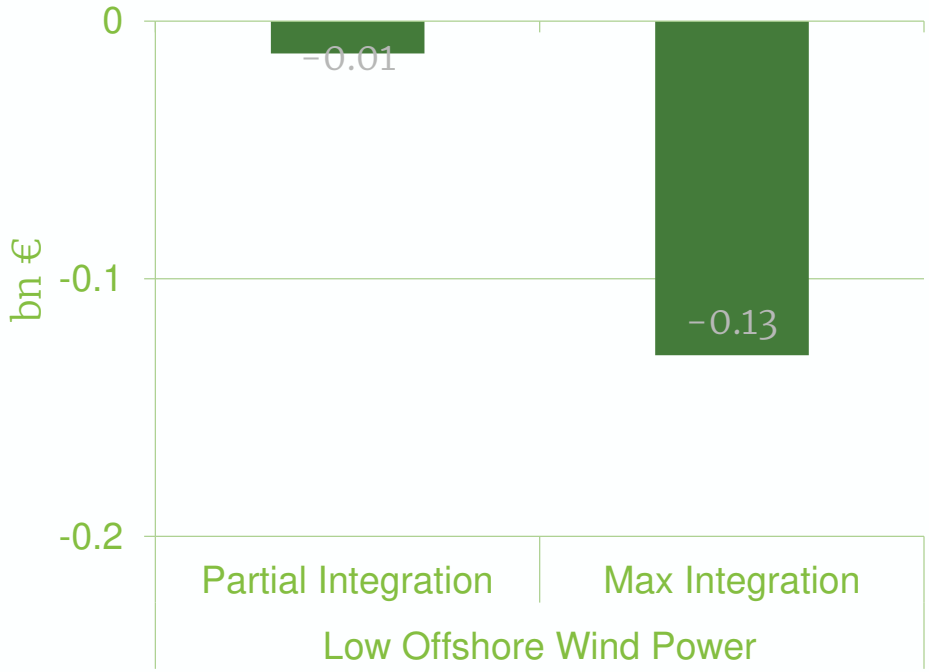
High Offshore Wind Power

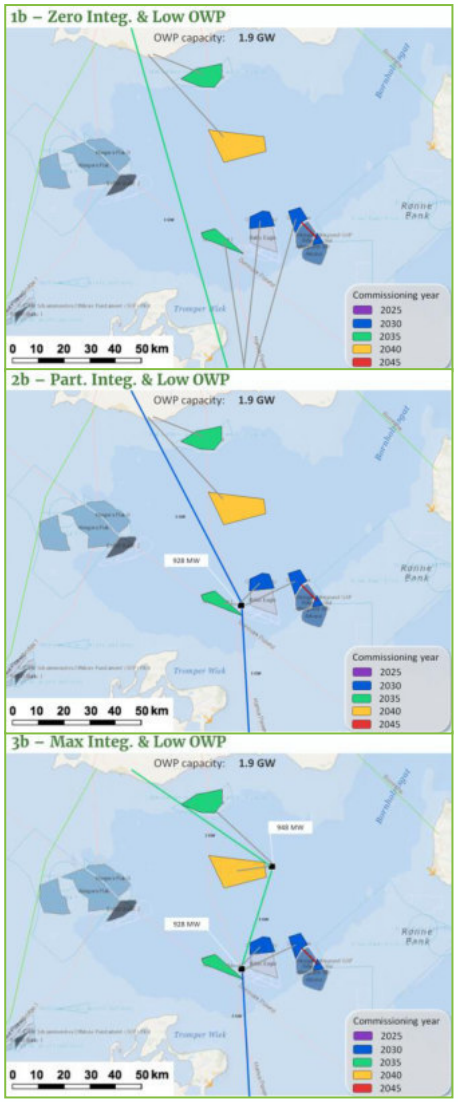




CS2 (DE/SE/DK)

Low Offshore Wind Power





Conclusions

- No general trend related to the evaluation of partial and maximum integration scenarios could be identified
- The cost structure is case specific
  - Cost reduction potential is higher when hub connections are also part of the zero integration case
  - Reduction of AC components could be positive but is often compensated by additional DC offshore node cost
- The main benefit brings the interconnection, which is already part of the base case (zero integration)
- Benefits are almost equal for partial and max integration scenarios, costs can vary significantly

Next Steps

- Finalisation of assumptions for future cost trends
- Inclusion of approximate cost assumptions for DC breaker
- CBCA (Cross-Border-Cost-Allocation) methodology and development of results

- **Next TWG seminar in Bremerhaven (15th of May, 16-19pm)**

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