Costs – list of indicators

- Cables (AC&DC)
- Offshore Nodes
- Onshore Nodes

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

Evaluated as most suitable cost data sets
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]
CS1 (SE/PO/LT)

High Offshore Wind power

Cost Results

1.56 1.05 1.30
0.45
0.29
0.53
1.81
1.30
0.02
0.02
0.93
0.93
0.93

bn €

HVAC Offshore Nodes
HVAC Onshore Nodes
HVAC Cables
HVDC Offshore Nodes
HVDC Onshore Nodes
HVDC Cables

CS1_1a Zero Integration
CS1_2a Partial Integration
CS1_3a Max Integration
CS1 (SE/PO/LT)

Low Offshore Wind Power

Cost Results

15 March 2018, Espoo
CS2 (DE/SE/DK)
CS2 (DE/SE/DK)

Low Offshore Wind Power

Cost Comparison

15 March 2018, Espoo
Sensitivity Analysis

Exemplary Analysis for CS1_2a (Part. Integ., High OWP)
Net Present Benefit
## CS1 (LT/PO/ SE)

<table>
<thead>
<tr>
<th></th>
<th>CS1 (LT/ PO/SE)</th>
<th>CS1 (LT/ PO/SE)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>High Offshore Wind Power</td>
<td>Low Offshore Wind Power</td>
</tr>
<tr>
<td></td>
<td>Partial Integration</td>
<td>Max Integration</td>
</tr>
<tr>
<td>CS1_2a – CS1_1a</td>
<td>CS1_3a – CS1_1a</td>
<td>CS1_2b – CS1_1b</td>
</tr>
<tr>
<td></td>
<td>CS1_3b – CS1_1b</td>
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<tr>
<td>Benefit Difference (higher is better)</td>
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<tr>
<td>0.06 bn€</td>
<td>0.09 bn€</td>
<td>0.92 bn€</td>
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<tr>
<td>0.99 bn€</td>
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<td>Cost Difference (lower is better)</td>
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<tr>
<td>-0.67 bn€</td>
<td>0.08 bn€</td>
<td>0.17 bn€</td>
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<tr>
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<td>-0.03 bn€</td>
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## CS2 (DE/SE/DK)

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<th>Low Offshore Wind Power</th>
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<tr>
<td>Partial Integration</td>
<td>Max Integration</td>
<td>Partial Integration</td>
</tr>
<tr>
<td>CS2_2a - CS2_1a</td>
<td>CS2_3a - CS2_1a</td>
<td>CS2_2b - CS2_1b</td>
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<tr>
<td><strong>Benefit Difference (higher is better)</strong></td>
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<tr>
<td>1.83 bn€</td>
<td>1.76 bn€</td>
<td>-0.03 bn€</td>
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<tr>
<td><strong>Cost Difference (lower is better)</strong></td>
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</tr>
<tr>
<td>0.46 bn€</td>
<td>0.04 bn€</td>
<td>-0.02 bn€</td>
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</tbody>
</table>
CS1 (SE/PO/LT)

High Offshore Wind Power

<table>
<thead>
<tr>
<th>Partial Integration</th>
<th>Max Integration</th>
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<td>High Offshore Wind Power</td>
<td>0.73</td>
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<tr>
<td></td>
<td>0.01</td>
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</tbody>
</table>

Net Present Benefit
CS1 (SE/PO/LT)

Low Offshore Wind Power

Net Present Benefit

Partial Integration: €0.75bn
Max Integration: €1.02bn

15 March 2018, Espoo
CS2 (DE/SE/DK)

High Offshore Wind Power

<table>
<thead>
<tr>
<th>Partial Integration</th>
<th>Max Integration</th>
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<tbody>
<tr>
<td>1.37</td>
<td>1.72</td>
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</tbody>
</table>

Net Present Benefit

15 March 2018, Espoo
CS2 (DE/SE/DK)

Low Offshore Wind Power

-0.1

bn €

Partial Integration  Max Integration

Net Present Benefit

15 March 2018, Espoo
• 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
• 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)
For further information:

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Web: www.baltic-integrid.eu

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